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EDITORIAL NOTES.

The Aggregate of a Year's Returns.

THERE was a lapse of about two years before the publication of the Board of Trade Returns relating to the statutory gas undertakings of the United Kingdom for 1913 for Companies and 1913-14 for Local Authorities succeeded those for 1912-13. The 1913-14 ones were issued, in ordinary form, in April last, and were dealt with in the "JOURNAL" for April 18. A few weeks since, information was received that the issue of the returns for the war period would be suspended, through the necessity for curtailing labour in the Government Departments as much as possible and avoiding unnecessary expense, but that there would be a renewal after the war. In the interim, it was proposed to publish the totals of certain of the items; and we must be grateful for these connecting links between the issue of the complete returns for 1913-14, and the year when there will be revival of them. In conformity with this arrangement, the department of the Board of Trade responsible for the collection and compilation of the returns have sent to us for publication the aggregate figures for 1914 in the case of companies and 1914-15 in that of local authorities; and they are published to-day in other columns.

It will be found that certain of the customary components of the table showing the aggregate of the items of the detailed returns are omitted, while new ones are included; and the selection for the temporary purpose is good. The items referring to capital, length of mains, and public lamps have been deleted for the time being; but for our purposes adequate compensation for the omissions is supplied by the analysis of the total gas made as between coal gas, water gas, and "other gas," and by that of the gas sold as between ordinary and prepayment meters, and public lamps. These items are not new in the detailed return; but they are as constituents of the table presenting the totals of certain of the prominent particulars. In the number of undertakings that made returns—834—there is an increase of three; the total of the companies making returns the preceding year having been reduced by one, and that for the local authorities having been increased by four. In regard to the financial and working issues of the year, it is very difficult to draw any particular lesson from them, except that, amid the complex and difficult conditions that arose during the opening months of the war, the gas business continued to progress, though the financial results showed retrogression. In the case of the companies, there were five war months and seven peace ones; while with the local authorities, there were eight war months and only four peace ones.

In the circumstances, there can be no clear discrimination as to the causes of the financial effects we see in the returns, nor, knowing the causes generally, could we assign to them any approximately reliable value. For instance, while statutory undertakings sold between them an extra 4,432,903,000 cubic feet of gas in the return year, the revenue of £34,808,522 from all sources was a decrease of £695,036 upon the previous year. All this reduction cannot be put down to the war part of that particular year; but it is no doubt attributable to several circumstances—such as the poor price of coke just before the war, the temporary wrecking of the other markets for residuals which succeeded the outbreak of hostilities (although there was then rehabilitation of that for coke), and many undertakings entered upon the war period with then recently reduced prices for gas. A satisfactory feature of the year is that, despite the increase in the gas business, the total expenditure declined by £27,218—from £28,242,104 to £28,214,886. Therefore, the difference of £695,036 in the receipts was brought down by the lessened expenditure to a net figure of £667,818. This experience in expenditure will not have repetition during the succeeding period of the war, as costs have risen considerably. In the year now being dealt with, coal and oil were being used delivered under pre-war contracts; and, therefore, although there was dislocation of the normal internal conditions owing to the needs of the war, expenditure for such industrial enterprises as gas undertakings, which have with prevision to make provision, was not immediately forced to maximum load. This was to come after. The last-named sum of £667,818 gives us the difference between the gross profit of 1913-14 (£7,261,454) and that for 1914-15 (£6,593,636).

Coming to working experiences, in this opening part of the history of the war, there were indications of gas undertakings putting forward energy to extract more gas from the coal carbonized than in the year preceding. The total quantity of gas made was 229,946,925,000 cubic feet—an increase of 5,429,758,000 cubic feet upon 1913-14. Of the total, 194,290,031,000 cubic feet were coal gas, which was a reduction of 1,536,538,000 cubic feet. In the making of this coal gas, 16,684,087 tons of coal were used, which quantity was less than the preceding year by 287,637 tons, when 195,826,569,000 cubic feet of coal gas were made. In the year 1913-14, the make per ton averaged 11,538 cubic feet, as compared with 11,645 cubic feet in 1914-15. The difference of 107 cubic feet per ton means that from the 16,684,087 tons of coal used, 1,785,197,309 cubic feet more gas were extracted than would have been the case if the average make had remained at the 1913-14 level. But while the total production of coal gas was smaller by 1,536,538,000 cubic feet, the quantity of carburetted water gas made was 30,200,564,000 cubic feet—an increase of 6,421,955,000 cubic feet, of which companies were responsible for 5,375,704,000 cubic feet, and local authorities for 1,046,251,000 cubic feet. The tabular statement does not give the quantity of oil and spirit used in the making of the carburetted water gas; and some time, when our friends at the Board of Trade are making further revision, they might perhaps supply the total of the particulars sent them respecting the liquid raw materials. Assuming the average use of oil and spirit was 2·4 gallons per 1000 cubic feet of water-gas produced, this would mean a consumption during the year of 72,481,354 gallons. Then we have recorded under "other gas" 5,456,330,000 cubic feet, as compared with 4,911,989,000 cubic feet in the preceding year. Special allusion was made to this item in our comments [April 18 last] on the previous returns, when we ventured to make certain suggestions. One was that care should be taken not to get the carburetted water gas returned as "oil gas" and so be included under "other gas;" another was that a separate and new entry should at once be made as to the use in town-gas supply of coke-oven gas. However, we suppose that the increase of 544,341,000 cubic feet of "other gas" is, practically speaking, entirely due to the South Staffordshire (Mond) Gas Company.

Although war conditions have reduced gas consumption for the illumination of streets, shops, and licensed premises, the gas industry, in the aggregate, is not doing badly in extending the ground of its gas business. This is said in the light of experience subsequent to that of the part-war period treated in the present statistical compilation. In this, we see that in the 1914-15 period the sale of gas was 210,907,376,000 cubic feet, or 4,432,903,000 cubic feet more than in 1913-14. Coming to the analysis of the sales, there is reason for a great deal of thankfulness to the prepayment meter consumers, and possibly to their capacity for spending more through their gas-cookers during these times when there is a plenitude of remunerative work for all who are capable and are willing to put forth energy. Of the total sales, the prepayment consumers took 55,535,742,000 cubic feet—an addition to their previous year's consumption of 5,590,898,000 cubic feet, which balanced the losses through ordinary meters and public lamps, and left the previously mentioned 4,432,903,000 cubic feet to the good. Through ordinary meters—including domestic, shop, and industrial

consumption—145,007,592,000 cubic feet of gas were sold, or a reduction of 720,056,000 cubic feet; and public lamps demanded 10,364,042,000 cubic feet, or less by 437,939,000 cubic feet. The total number of consumers at the end of the year was 7,298,007, or an advance of 194,894, of which advance ordinaries contributed 56,389, and prepayments 138,505. With an eye on the future, these statistics as to the expansion of the foundation of the industry's business are highly satisfactory.

Calorific Power Bill and Distribution Pressures.

THE Gas (Standard of Calorific Power) Bill has passed through the Committee stage in the House of Lords, and is to be reported to the House to-day, with amendments. The measure, so far as we are at present aware, has not been altered in any particular that is important, save one. This exception is an extension of the powers conferred upon the Board of Trade and the Local Government Board, the reasonable exercise of which extension will not matter one jot where there are well-ordered distribution systems. The motion for the addition to the Bill was in the name of Viscount Churchill; and its acceptance gives to the Order-issuing Departments the right to make such variation, "as "they may think desirable," of the prescribed pressure at which gas is to be supplied. In this addition, no specific pressure is mentioned; it is not obligatory on the Departments to make any variation from existing conditions; and they will certainly consider any evidence as to the circumstances of an undertaking before determining whether any change is "desirable," and, if so, its extent. The old minimum pressure of 8-10ths has long since been out of countenance with current conditions, though convenient in some of the small extremities of a distribution system where supply comes to a dead-end. But such a minimum pressure is to-day, generally speaking, opposed to both practice and use. Pressures are considerably greater now—they have perforce to be so—than when the old minimum of 8-10ths was established; and various Parliamentary Committees have been satisfied that the minimum should be raised. But it ought only to be raised with some qualification protecting the undertaking at extreme points; and there should be protection in this respect in any change that may be effected. In various Acts of recent sessions, the minimum has been increased; for instance, in the session of 1914, the minimum pressure in one case was placed at 20-10ths, in another at 15-10ths, and in a third at 12-10ths. However, the ability to change from the illuminating standard to the calorific one is the important point; and directly the Act receives the Royal Assent, applications for Orders can be made. First consideration will be given to those who are doing their utmost to assist the country in the provision of benzol and toluol, or are prepared to so assist.

Contractors' Engineers and the Institution of Gas Engineers.

THERE were two letters in last week's "JOURNAL" that are the issue of the editorial article on "Traders" published a fortnight since. It is significant that one is signed "New "Age," and that in the opening lines of the second, by Mr. Maurice Graham, reminder is given to those who may need it, or the information imparted to those who may have been too busy or not sufficiently alert to note one of the predominant facts of modern times, that the old order of things in the gas industry has changed. It has changed in remarkable manner; the change has made further progress during the war; it is going to progress still more after the war. A "New Age"! It will be a new world on which we shall look out immediately after the war; a new life in which we shall have part. The gas industry has to ask itself what is to be its place in that new world and new life, and how best is it to equip itself for filling that place. The ideal of the industry as to the place should be a large one; the larger the ambition, and the greater the effort made to attain it, the better. The effort will not be successful if under the influences and restraints of conservatism. New conditions need new methods. Development must be supported by development in every direction. But while wherever we look in the industry change is seen of momentous character, from the process of carbonization to the uses of the primary and secondary products, we are faced with the fact that about the only thing that has not changed in the industry has been the premier organization, although organization is of supreme importance in an industry composed of such varied and interdependent interests, and having to deal in so many markets, and to meet such a diversity of competition.

The new premier organization that we have suggestively adumbrated in the course of our several articles has been one representative and therefore powerful, through the inclusion in it of all elements dealing with administration, finance, technical and commercial matters, and plant and appliance production; and the Institution of Gas Engineers has been pictured continuing its technical work in the engineering and manufacturing lines, and initiating and supervising research financed by the premier organization. "New Age," in his letter, showed that the Institution in technical work alone could be considerably improved, and made a more effective body, by the infusion in the membership of new blood—in other words, by the admission of (let us say) real engineers, trained and experienced men; who spend all their time on engineering, and not the greater part of it in putting to the best possible use the plant provided by the contractor, and a large proportion of the remainder in dealing with purely trading matters. The Institution of Gas Engineers, as "New Age" showed, stands unique in not admitting such qualified engineers into its ranks. The Institution apparently prefers to preserve its interesting, if not very profitable, character. Yet no good reason, we venture to think, could be advanced for the exclusiveness at present shown, and which exclusiveness, while admitting a man who has never been trained as an "engineer," but who by merit has risen to the management of a small gas-works, denies the right of entry to the trained engineer who designs and carries out gas plant of all sizes, sorts, and conditions. This anomalous condition of things is in keeping with other out-of-date characteristics of the Institution.

The claim, however, is now made through the letter of "New Age" to the right of all engineers who design and superintend the construction of gas plant to admission to an Institution with "Gas Engineers" standing as part of its title. Challenges to the Council of the Institution are to be found in the letter. In one place our correspondent writes: "It can scarcely be credited that the Council of the Institu- "tion of Gas Engineers hold the opinion that the inclusion "of such engineers would be of little benefit from the tech- "nical point of view, and that gas engineering as a profes- "sion would not gain some advantage from any contributions "to the proceedings of the Institution that contractors' "engineers might be able to make." We should like to see what answer to this would be made individually by members of the Council, everyone of whom looking round his works would doubtless see many pieces of plant, the origin of which is due to the skill and inventiveness of the contractors. Is there nothing in the way of recognition due to these men on the part of the gas-supply engineer? Is there nothing that the gas-supply engineer can possibly gain by closer association and deliberation with contractors' engineers? We will not commit the absurdity of answering in the negative. In the interests of progress, the maintaining of an artificial barrier between contractor and manufacturer and user is as stupid as anything can be. The contractor and maker and user should be in constant contact; and joint conference at ordinary meetings should have, and is bound to have, reciprocal advantage in many ways—especially in that most necessary way of all, advancement in economy and efficiency. Discussion by many minds from different or all points of view is the best method of achieving such progress. But at the present time the gas-supply engineer shuts the doors to membership and meeting room in the face of the contractors' engineer, which is neither polite nor wise—"nor wise" because it simply means that the former entertains the very short-sighted view (if he thinks anything about the matter) that the best advance is to be made by keeping at arm's length the very men who are of assistance to him, and who certainly could raise the level and tone of the engineering part of the proceedings. The Council of the Institution may reply to this that invitations are occasionally issued to manufacturers' engineers to be present at meetings, and take part in the discussion of papers—papers prepared by gas-supply engineers. But this is simply an act of condescension on the part of the Institution. That is not what is wanted. Those who have been largely instrumental in improving gas plant, who will continue to be so, and who desire to be so to the maximum of their ability, want as a matter of right to be present at the meetings of gas engineers, take part in the discussions, read

papers dealing with work and problems of mutual importance, and be on a level footing with all other gas engineers and not be meeting with them on such occasions merely on sufferance.

The letters by "New Age" and Mr. Maurice Graham have brought a contribution from Mr. F. S. Cripps, who is able to write from a fulness of experience in various spheres and circumstances, and, in writing, he has no hesitation in saying exactly what his experience has been. It was "New Age" who opened up the question as to the admission of contracting gas engineers to full membership of the Institution of Gas Engineers, and Mr. Graham who specifically raised the point as to the fairness of the process through which contractors' engineers had to pass in making application for transfer from associate membership to complete membership of the Institution of Civil Engineers. The principle of technical eligibility does not seem to weigh in this matter; but there appears to be a good deal of that actuating force predilection brought to bear in the examination of nomination papers, and in the acceptance or rejection of candidates for transfer. But our special business is with the Institution of Gas Engineers in association with the question of bettering the industry's organization. And when Mr. Cripps says: "More real engineering passes through "a big contractor's hands in a twelvemonth than the ordi- "nary gas manager's in a lifetime," need—unless what is intended to be conveyed in these words is capable of disproof—anything further be said in regard to engineering qualification, or as to the inconsistency of the policy that excludes eligibles from the highest rank, but includes ineligibles. Mr. Cripps touches a delicate point, which with some narrow-minded people is a vital one, in connection with the Institution of Gas Engineers. Contracting engineers and members of their technical staffs must not now have visited upon them the sins of the old-time commercial traveller, who was naturally far more concerned for his own commercial prosperity than for the general prosperity of the industry, although hoping that nothing untoward would happen to the latter, so as to interfere with his personal success. Nor is there any justice in causing the innocent to suffer owing to those who are guilty of offence. But when an old departure from virtue—actual or only suspected—is made the ground of exclusion from an organization, is not this a reflection upon the want of resisting power of the members themselves? A lot of water has passed under the bridges since the times of which Mr. Cripps writes. The old order has changed, and has given place to a new. But it is evident that certain men's opinions on the subject became petrified in those past times, and are not now susceptible to change. Such men will have to be bye-passed, as also must be those men who say: "But we have been going "on all this time, and it is only just lately that we have "heard of this desire of administrators, contracting engi- "neers, and others to become members of the premier or- "ganization, and those qualified also of the technical body." Let us repeat: "Times have changed." The old plain ways of management and of work in the gas industry are not of to-day; policy, finance, and much else have undergone extraordinary metamorphosis. So, too, have plant, processes, and appliances, in variety, in range of size, and in point of capabilities and efficiencies. Looking at these matters, it is childish for men to seek defence for the conservation of the old order of things by appealing to what has been, or has not been, in the past.

Lives or British Thermal Units.

For any shortage in high explosives and other munitions, this country and its Allies will have to pay in life, limbs, sight, and human suffering, in destruction of property, and in the prolongation of the terrible war. Nevertheless, there appear to be ten men of the Widnes Town Council who, by their votes, have ranged themselves on the side of those who will not put forth their maximum strength, and to the length of their deficiency are contributing to the jeopardizing of the supply of high explosives, the daily expenditure of which is now enormous. To this country, providentially in excellent position for meeting the demand, not only our own Army and Navy, but our Allies are looking for supplies, through their own disability in keeping pace with their requirements. The coke-oven district of France, from which in normal circumstances benzol and toluol would come, is in the hands of the Germans; and therefore France has to rely largely upon this country for her main supplies of benzol and toluol. Only last Thursday there was a conference at the Ministry of Munitions regarding the munition supplies to Russia; and later the same day a conference was held to consider the munition supplies of Italy, which, like Russia, is not well provided with works from which the essentials for making high explosives are obtained.

The great offensive upon all fronts has commenced well and favourably for the Allies; and munitions, and a continuous flow of them, on the highest possible scale, are now required. The Gas Committee of Widnes, headed by Alderman Timmis, are desirous that Widnes shall not hereafter hear the accusing voice that it did not do its fullest share in supplying benzol and toluol in the present terrible emergency; and so they asked the Council to sanction the erection of plant for extracting from the gas a larger percentage of these urgently needed essentials. But ten men, giving a majority of two, have vetoed this patriotic and humane desire, on the ground that the lowering of the calorific power of the gas would prejudice the local industries, and cause the ordinary consumers to introduce electricity. Paltry reasons! As is also one advanced by the Mayor (Mr. John Hedley) that the reduction of the illuminating power of the gas would put the local works in darkness and stop the plants. We are at war; and an 8 or 10 candle gas will do considerably more in an incandescent burner than 16-candle gas used with an antiquated flat-flame one. Long before the war, the normal gas supply in many places in Germany was no more than about 10 candles; and the late Mr. Edward Allen, of Liverpool, confessed that he thought the German 10-candle gas did better in incandescent burners than his then fat (in luminosity) Liverpool gas. Thousands of guns are booming and reverberating along the long stretches of blood-sodden front, preparing the way for our own sons and for those of our gallant Allies, fighting in defence of weaker nations, in the cause of honour, and in the suppression of Prussian militarism, of the cold blooded savagery of which our own brave troops, cities and towns of this and other countries, defenceless men, women, and children, and many unarmed ships and their human freights, have had fearful example. In face of all this, the calorific value of the gas supplied to Widnes industries and domestic consumers must not suffer by a small percentage! What a contrast! And what an exhibition of the utter want of a sense of higher responsibility! Other towns are doing just what the Gas Committee of Widnes were proposing to do; and the local industries are not distressed in consequence, nor are the ordinary consumers rushing over to electricity. The fact of the matter is that the reduction of the calorific value is so inappreciable that people do not realize that any change has occurred in the constitution of the gas. If they did, they would be content to suffer the diminution for the sake of the great cause for which the allied forces are fighting.

The cry comes from the trenches for more high explosives; the munition workers of the country are asked to forego their holidays in order that supplies shall not be even temporarily deficient. Simultaneously, ten Widnes men are, on the lamest of excuses, obstructing the realization of the greatest possible supply of benzol and toluol. Had Widnes been a German town, these men would not have had an opportunity of refusing to increase their contribution of benzol and toluol. They would have been commanded to do it. If there were many such obstructives, it would be necessary to make compulsory the oil-washing of gas; but we are confident the majority of gas undertakings under British control will ride above compulsion. It is to be sincerely hoped that further consideration will bring about a speedy revocation of the Widnes vote.

During the discussion which resulted in the small majority of the Widnes Council overthrowing the scheme of the Gas Committee for rendering greater help to the State by the oil-washing of their gas, the letter was quoted which Mr. Charles Carpenter, D.Sc., published in our columns on the 4th inst., under the title of "The 'Will-o'- "'the-Wisp' of Uncarburetted Hydrogen." How much the opinions expressed in that letter helped to support the ten members of the Council who successfully obstructed the plans of the Gas Committee cannot be said; but they made the utmost use of it in gaining their point. The incident shows how impolitic was the letter just at this time, and how justified was the protest that Mr. Thomas Glover, of Norwich, made in our last issue. After our comments of last week [see p. 58], we need not say anything in supplement of the protest; but it may be added that various private communications have been received by Mr. Glover

from men of good position in the gas industry—men whose outlook on its affairs is broad, and whose vision is as penetrative as any other man's—confirming the views which he so ably expressed.

The Government and Technical Scholarships.

A practical report, containing some far-reaching recommendations, has been issued by the Board of Education Consultative Committee, of which the Right Hon. A. H. Dyke Acland is Chairman. They have been specially considering the development of scientific and technological education for the purpose of supplying trained students competent to render public service in the industries or in research. The scholarship system already costs annually a considerable amount of money; but the Committee rightly think that further investment in this direction will be of advantage to the industries, and through the industries to the nation. That the money spent has not in the past been of special value to the industries, shows that there has been in some degree misdirection or an insufficiently widespread allocation. But the Committee desire to make up for this. A main feature of the report is a recommendation that the Government should provide from the national funds an amount of £329,500 a year for the purpose of strengthening the higher parts of secondary schools and providing scholarships; and a section of the Committee recommends an additional sum of £10,000 for the extra expenses at Oxford and Cambridge Universities.

Scholarship Awards for Merit and Capacity.

The national interest is at the base of the scheme; and the Committee are making a very acceptable departure through looking at the matter broadly. Academical successes are not, if their proposals are adopted, alone to secure scholarships; but merit and capacity in other ways are to have their share in the awards. One of the greatest mistakes of the existing educational system has been the denial of opportunities to young fellows who show a special bent in some valuable direction, but do not happen to excel in branches of learning that are not essential to their usefulness and progress in certain walks of life—say, in industry requiring technical knowledge and skill. Therefore, we are pleased to see the fourth and fifth recommendations of the Committee: "(4) That a certain proportion of scholarships to places of higher education should be granted to candidates who show merit under scientific and mathematical tests alone, without any test of general education beyond an examination in the English language. (5) That the matriculation tests at the universities be modified so as to admit to full university privileges scholars who, having obtained their training by part time or discontinuous instruction, have been selected by the tests indicated in recommendation 4, and are able to satisfy the university authorities that they are fit to take advantage of university instruction in science or technology." The sum suggested for the purpose of these scholarships, the Committee recognize, is only a small part of the necessary cost of bringing the education provided, even in science and technology, up to an adequate standard. They also urge that existing institutions devoted to scientific and technical education should be brought up to the national needs both in equipment and *personnel*. For all this, money would be required: but it would be money well spent.

Coke Difficulties and Steam-Raising.

Under the heading of the "National Economy of Fuel," an article has been published by the "Electrical Review" dealing specifically with the use of gas coke for steam-raising. The author's intentions are good; but it is pretty evident that he is not intimately acquainted with gas making, or he would not, for instance, have spoken of coal being "roasted" in gas retorts, nor of coke being "burnt" to make water gas. The writer is favourable to the use of coke for steam-raising as a means to fuel economy, providing it will be conducive to an improvement of both the employers' and the nation's resources. But he is afraid certain difficulties will be obstructive to its use. The first one mentioned by him is the question of bulk. For the same thermal capacity, he says, coke may be taken to occupy 35 per cent. more space than coal, even when broken. This raises the question of greater storage accommodation, the size of railway waggons, and the capacity of conveying gear. Coke would be bought under contract; and as the production is continuous at the local gas-works, which in most cases would be nearer than the colliery from which coal supplies are at present drawn, there would be no necessity for extra storage at the electricity generating station, nor for more waggon provision. The conveying gear, too, is only used intermittently; so there would be no need to enlarge its capacity. As to the extra ash, this is not found to make any very material difference in the expenditure on disposal. The author speaks of the exercise of considerable patience in getting coke to ignite; also as to the need for a high draught to keep the material alight—special reference being made to chain-grate stokers. In the "Electrical Review" last January, Mr. E. W. L. Nicol, the Expert of the London Coke Sales Committee, described ["JOURNAL," Jan. 18, p. 165] how chain-grates working in this country under boilers of 20,000 lbs. per hour capacity have been modified to burn coke without material reduction in capacity or efficiency. As to ignition, the admission of a thin layer of coal slack with the coke will ensure this. But the writer's conclusion is that suitable conditions with coke—early ignition, and a well-sustained combustion—"being met on a grate having a sufficient area to allow for a low rate of fuel consumption (approximately 18 or 20 lbs. per square foot), it will be found that a high CO_2, and consequent high furnace temperature, is obtained, and will give a somewhat more efficient evaporation than coal." "All's well that ends well."

Legislation as to Crude Tar on Roads.

We doubt whether there is much (if any) crude tar employed for road purposes to-day; but if there is, it would be interesting to know where it is so used, and by whom, and probably the information would also be welcomed by the Ministry of Munitions and the Road Board. The allegation was made last week, at the annual meeting of the Salmon and Trout Association, that crude tar was still being applied to roads, that it caused the pollution of rivers, and that it had a disastrous effect on fish. The wastefulness of the use of crude tar at the present time was pointed out; and doubts were also expressed as to the asserted harmlessness of prepared tar. But what was more interesting and to the point was a resolution on the part of the Association to promote legislation to enable action to be taken against anyone who uses crude tar for road surfacing, making, or mending. The matter was referred to the Experimental Committee of the Association, with powers to instruct Counsel to draft a Bill to lay before Parliament. The Bill, if proceeded with, will probably be introduced in the House of Lords, as Lord Desborough said he should be pleased to take charge of it. So far as gas undertakings are concerned, there will not be much objection from those who have adopted dehydration or complete distillation plants; and possibly legislation of the kind would be an inducement to other gas undertakings not only now, but after the war, to adopt the primary tar distillation process, instead of being parties to the waste on roadways of constituents highly valuable now for the war, and for industries in the peace times to come.

Fixing Gas Rates in America.

The celebrations at Baltimore, in the middle of last month, of the centenary of the introduction of gas lighting into America were marked in various ways—in one way by an address by Mr. A. G. Glasgow, which was piquant and statesmanlike in the comparisons and criticisms it contained of the regulations as applied by Parliament to gas supply in this country and by the State Commissions of America. A basic principle in formulating regulation is that it should be encouraging to investors, and should be helpful in facilitating the pursuit of efficiency and economy and the development of service to the advantage of consumers. Oppressive regulation is detrimental in every way—from the subscription of capital to the attraction of the highest talents which provide the assurance of the maximum attainable usefulness. Mr. Glasgow praises the conception, application, and utility of the sliding-scale in the case of British gas companies. It is the embodiment of the community of interest that exists between producer and consumer; and it is active in ensuring the complete realization of its objects, besides being a potent factor in the stability of the gas industry. But these facts, with the further one that before the outbreak of the war Great Britain could well boast of the cheapest gas supply in the world, must not be construed into a suggestion that all legislation that has been

applied to the home gas industry has been conducive to progress and to the best public service. This would be a mistake. But it can be asserted that the legislation has, on the whole, been free from the marked peculiarities that are found in so many of the regulations that have emanated from the State Commissions of America. Mr. Glasgow gives an instance. It is in respect of the confiscatory attitude assumed by most of the State Commissions in fixing gas rates. In doing this, they altogether ignore earning capacity. They make an estimate of the cost of structural reproduction, and then deduct for depreciation one-third from the estimate, on the ground that the property is second-hand. Then they resolve upon a selling price for gas which allows the company to earn 6 per cent. upon the estimated cost of structural reproduction, reduced by the one-third depreciation. Fixed and limited conditions such as these cannot be in fairness applied to the determining of selling prices, as many other conditions, some of which are variable, and not under control, should be considered. The system is, to say the least, repressive to the best effort in private enterprise; and such repression means that the public, as well as the investor, suffers.

Raising the Standard Addition to Coal Prices.

Last week it was announced that the Board of Trade had sanctioned, on the representation of the South Wales Coal Owners' Association, an advance of 2s. 6d. per ton in the price of coal for home consumption, making the extra charge under the Coal Price Limitation Act 6s. 6d. per ton. The coal owners submitted the 15 per cent. addition to the South Wales miners' wages, granted under a recent decision of the Government, as an argument for allowing the extra 2s. 6d. The "Yorkshire Evening Post" says that all the Coal Owners' Associations have been seeking permission from the Board of Trade to raise the standard. So far, however, as our contemporary can make out, the West Yorkshire coal owners have not yet been given permission to make an advance in price; but "there is a disposition in the trade to believe that some advance will be permitted even if not to the same extent as has just been allowed in Wales." Before the Board come to any decision in this matter, strong representation should be made that, so far as the gas industry is concerned, the coal owners have already achieved their purpose by the fact that many gas undertakings have only been able to get offers of coal by agreeing beforehand with the views of owners as to price. Most concerns have to pay figures about 5s. to 5s. 6d. above the pre-war (1913-1914) prices; and this should be taken into consideration before the 4s. standard is increased—particularly so since contracts include a clause giving the coal suppliers power to add to the already inflated contract price any addition which the Board of Trade authorizes. If the standard amount of 4s. is increased by anything up to 2s. 6d., as suggested by our Yorkshire contemporary, gas undertakings will, by virtue of the clause included in contracts, have to pay 5s. to 5s. 6d., *plus* the addition, instead of the original 4s. The Board leave it to gas undertakings to complain to them if high prices are charged; but none dare do so, because penalization is likely to follow in the matter of deliveries.

Compensation Problems.

A question which has already been receiving attention in various quarters is the employment of disabled soldiers. In addition to the overwhelming moral claim for consideration which men will possess who have suffered in their country's cause, there are many jobs in civil life that can well be performed by soldiers discharged as no longer fit to serve in the army. In fact, it is stated in the course of a report which has been adopted by the War Pensions Committee of the Leeds City Council that, under present conditions, there is little or no difficulty in placing disabled soldiers in employment. It is felt, however, that the time when trouble may come will be after the war, when competition arises with men who have not been disabled. Because their position will be the more precarious if they are in unskilled occupations, efforts are made to persuade them to learn a skilled trade. But here another difficulty will present itself, this time in connection with the Workmen's Compensation Acts; it being recognized that the presence of a partly disabled man in a factory may involve the charging of a higher premium rate by the insurance company. It is therefore suggested by the Committee that the Government should take action to remove this disadvantage from disabled men. This, too, is not the only modification of compensation conditions which is at the moment being suggested on behalf of the employee; for the Miners' Federation of Great Britain, considering the matter at their conference last week, expressed themselves in favour of the amendment of the Acts in more than one respect. In the first place, they agreed with a suggestion that the minimum compensation to an adult should be 10s. per week, where the average earnings were less than £1, and that an infant who was earning less than 10s. per week should obtain an increase from time to time equivalent to the actual amount he would have been earning but for the accident, so long as the amount did not exceed 10s. Other proposals carried were that the Act should provide for compensation from the first day of injury; that the words "arising out of and in the course of the employment" be struck out, and the section made to read: "In any employment if personal injury by accident be caused a workman the employer shall be liable to pay compensation;" and that the disease or sickness caused by the inhalation of poisonous fumes from explosives should be included in the schedule to the Act.

PERSONAL.

Mr. Herbert B. Knowles, Assistant Gas Engineer to the Darwen Corporation, has been married to Miss R. Gibson, of Morecambe.

Sir Hallewell Rogers, the Chairman of the Birmingham Corporation Gas Committee, has lost his only son, Second Lieutenant Esmond Hallewell Rogers, of the Royal Warwickshire Regiment, who was killed on the 2nd inst. He was 25 years of age.

Mr. Harold Clapham, of the Morecambe Corporation Gas-Works, has been appointed Secretary and Manager of the Redcar, Coatham, Marske, and Saltburn Gas Company, in succession to the late Mr. Mark Fligg. There were over seventy applicants for the position.

Lieutenant Hugh Cloudsley, of the Royal West Surrey Regiment, who was killed on the 1st inst., was the youngest son of the late Mr. John Leslie Cloudsley. Born in 1884, he was called to the Bar in 1906. On the outbreak of war, he rejoined the Inns of Court O.T.C., in which he had previously served four years, and was gazetted to the West Surrey Regiment in November, 1914. He had been on active service since July last year.

The Directors of the Cardenden Gas Company have appointed Mr. Walter Dunlop, of Kirkcaldy, Gas Manager in place of Mr. William Brown, who, as already notified, has received an appointment at Burntisland. Mr. Dunlop has been Works Manager at the Corporation Gas-Works at Kirkcaldy for the past eight years. Mr. James C. Stevenson, of Cardenden, has been the successful applicant for the position of Secretary to the Gas Company. The late Manager held the two positions; but they have now been separated.

Lieut. L. C. Watson, of the West Yorkshires, who is a victim of shell-shock, in the course of the great offensive, is the second son of Mr. James Watson, the Bradford Water-Works Engineer. Before the war he was following the same profession as his father; being stationed at the Colsterdale undertaking of the Leeds Water Committee. Mr. Watson's eldest son, Lieut. James Watson, is wounded and in hospital. A younger brother is trooper Leslie Watson. Second-Lieutenant J. Sydney Clapham, of the West Riding Regt., who is in a Dover Hospital suffering from shell-shock, was with the firm of Bailey and Clapham, gas engineers of Keighley, when he enlisted, in September, 1914, as a private, receiving his Commission about six months later.

"Gas-Saving" Cooker Devices.—On the subject of so-called gas saving cooking devices, which was referred to in the "Journal" last week, the July issue of the "Bulletin" of the British Commercial Gas Association has an article, by "F. W. G.," which opens as follows: "The Executive Committee have had before them on more than one occasion, and the Secretary receives frequent communications respecting, the claims made in advertisements of the 'Multi Cooker,' the 'Swift Cooker,' and other gas appliances, that they save '15s. in the £1 of gas bill,' 'guarantee 75 per cent. saving in gas,' enable the user to cook a full-course dinner with one burner only instead of requiring four, and so forth. Readers of the 'Bulletin' hardly need to be told that the claims made are ridiculous, and quite incapable of substantiation. They may, however, be interested to know that those claims are so far from being justified that there is not only no '75 per cent. saving' to be effected by the use of these extensively advertised articles, but that careful comparative tests of cooking such a 'full-course dinner' as can be accommodated in one of them show that the consumption of gas in the 'guaranteed saver of 15s. in the £1' is actually *greater* than in modern gas-cookers such as are supplied on hire by many gas undertakings."

BOARD OF TRADE "GAS UNDERTAKINGS RETURNS."

As already announced in the "JOURNAL," the Board of Trade do not propose to publish the returns relating to authorized gas undertakings in the United Kingdom for the year ended March 31, 1915, in the case of undertakings belonging to local authorities, and for the year 1914 in the case of other authorized gas undertakings. They have, however, caused a summary to be made of certain of the particulars contained in the returns; and this we reproduce below.

Summary of Certain Particulars given in Returns made by Authorized Gas Undertakings in the United Kingdom for the Year ended 31st March, 1915, in the Case of Undertakings belonging to Local Authorities, and for the Year ended 31st December, 1914, in the Case of Other Undertakings.

—	Number of Undertakings.	Receipts.	Expenditure.	Quantity of Coal Carbonized.	Quantity of Gas Made.			
					Coal Gas.	Water Gas.	Other Gas.	Total.
		£	£	Tons.	Thousand Cubic Feet.	Thousand Cubic Feet.	Thousand Cubic Feet.	Thousand Cubic Feet.
Companies' Returns, 1914—								
England and Wales	497	22,240,557	18,108,074	9,613,231	114,148,615	23,264,905	5,452,612	142,866,132
Scotland	5	89,747	74,913	59,011	585,844	..	..	585,844
Ireland	16	484,337	373,705	164,023	1,887,514	502,920	..	2,390,434
Total, United Kingdom	518	22,814,641	18,556,692	9,836,265	116,621,973	23,767,825	5,452,612	145,842,410
Local Authorities' Returns, 1914-15—								
England and Wales	239	9,156,841	7,309,366	5,055,393	58,857,084	5,169,881	3,529	64,030,494
Scotland	60	2,436,990	2,008,403	1,629,555	16,841,420	232,700	189	17,074,309
Ireland	17	400,050	340,425	162,874	1,969,554	1,030,158	..	2,999,712
Total, United Kingdom	316	11,993,881	9,658,194	6,847,822	77,668,058	6,432,739	3,718	84,104,515
Companies' and Local Authorities' Returns— Total, United Kingdom—								
1913 and 1913-14	831	35,503,558	28,242,104	16,971,724	195,826,569	23,778,609	4,911,989	224,517,167
1914 and 1914-15	834	34,808,522	28,214,886	16,684,087	194,290,031	30,200,564	5,456,330	229,946,925

—	Quantity of Gas Sold.				Number of Consumers.		
	To Ordinary Consumers.	To Prepayment Consumers.	For Public Lamps.	Total.	Ordinary Consumers.	Prepayment Consumers.	Total.
	Thousand Cubic Feet.	Thousand Cubic Feet.	Thousand Cubic Feet.	Thousand Cubic Feet.			
Companies' Returns, 1914—							
England and Wales	87,703,293	37,295,223	5,225,555	130,224,071	1,729,344	2,498,150	4,227,494
Scotland	326,095	184,276	27,297	537,668	13,264	12,079	25,343
Ireland	1,378,257	559,968	139,155	2,077,380	27,306	62,549	89,855
Total, United Kingdom	89,407,645	38,039,467	5,392,007	132,839,119	1,769,914	2,572,778	4,342,692
Local Authorities' Returns, 1914-15—							
England and Wales	41,575,396	14,266,039	3,796,054	59,637,489	1,092,809	1,059,825	2,152,634
Scotland	11,925,062	2,779,092	967,540	15,671,694	468,454	234,892	703,346
Ireland	2,099,489	451,144	208,441	2,759,074	57,996	41,339	99,335
Total, United Kingdom	55,599,947	17,496,275	4,972,035	78,068,257	1,619,259	1,336,056	2,955,315
Companies' and Local Authorities' Returns— Total, United Kingdom—							
1913 and 1913-14	145,727,648	49,944,844	10,801,981	206,474,473	3,332,784	3,770,329	7,103,113
1914 and 1914-15	145,007,592	55,535,742	10,364,042	210,907,376	3,389,173	3,908,834	7,298,007

ELECTRICITY SUPPLY MEMORANDA.

THE managements of many electric undertakings are contemplating the current year with anything but complacency; and rates of charge are freely making further ascents. Necessity in this case knows no law other than that which imposes a maximum charge. All the formulæ that were of old supposed to rule electrical tariffs are being abandoned; the only principle that now governs advances in price being that which ever advises that both financial ends should be made to meet. Costs and consumers' economies are too material to be resisted without price compensations. The 10, 12½, and 15 per cent. price additions of early war times are now "back numbers;" and the increase at Hampstead of 23⅓ per cent. (making 33⅓ per cent. since the war started) and at Redditch of 30 per cent. are signs of the times, and illustrative. Several other concerns have made step-by-step progress in rates that equal the examples. Many undertakings, too, are making drastic revisions of their tariffs; and some are introducing excellent arithmetical problems for the delectation of their customers. The Finchley Council have concluded that it is an act of wisdom to put the minimum consumption for charge at 10 units per quarter in the summer, and 20 units per quarter in the winter, coupled with a further 10 per cent. advance in price. The Hartlepool Corporation have altered the whole of their charges; and among the items, the standing charge under the rateable value system for private houses has not been considered inviolable. It has been put up to 20 per cent., *plus* ½d. per unit for all electricity consumed. The advisers of the Corporation have thus assured themselves of their full pound of flesh. The rateable value system takes away the liberty of the consumer to benefit his purse by economizing in the use of electricity if he so desires in these times. The St. Pancras Borough Council have just decided to abolish the kilowatt demand system of charging—£4 per annum per KW., *plus* ½d. per unit. The Hereford City Council have decided to level-up their 4½d. and 3d. lighting units to 6d. per unit, with a 25 per cent. increase on all other units, making 35 per cent. upon pre-war charges. The Charing Cross (West-end and City) Electricity Supply Company have adopted a scale of charges that will defy the checking powers of some of their consumers who are not accountants. The new charges are per quarter: 5d. per unit for the first three units consumed per 30 watts of connected demand; 4d. per unit for the next eight units per 30 watts of connected demand; all in excess, 2d. per unit. Another example of intricacy for consumers is the new general supply rates at Hartlepool: 4d. per unit for the first 1500 units consumed per quarter, and 3d. per unit after; or at ordinary flat-rates of 4d. and 3d. for all electricity consumed between the hours of 4 p.m. and 10 p.m. during November to the end of February, and between 7.30 p.m. and 10 p.m. from March to October, and at 2d. per unit during all other hours. Electricity accounts at Hartlepool should keep householders out of mischief for several hours per quarter, in the effort to ascertain whether or not they have been justly charged. Power and heating consumers are properly having to bear a share of the burdens. Coventry has a large power demand; but the Corporation have adopted a scale of increases with coal as the basis. When coal costs 13s. 6d. per ton, but is less than 14s. 6d., there is to be an increase of 2 per cent. in the charge for power supply, and so on until, when the price of coal is 20s. 6d., but does not exceed 21s. 6d., the increase in the charge is 16 per cent. In many places, where a percentage increase has not been adopted, power and heating charges have risen to 1½d., 2d., and 2½d. per unit; and there will not be much new power or heating business to be obtained at these prices. The charge for slot meter

Price Revisions and Arithmetical Problems.

supplies at Llandudno has been raised from 5d. to 6¼d. per unit. The revision of charges not only shows the pressure of the times, but in the differences of the method of making, and in the amounts of, the additions, we see both the effects of local conditions and of the ingenuity of those who advise as to electric rates.

Artificial Light Saving.

"Electrical Engineering" has just made an inquiry into the effect upon electricity sales of the advancing of the clock by one hour during summer time, and has had the opportunity of inspecting the load curves of a few leading supply undertakings in various parts of the country. From the interest with which our contemporary supplied its readers, we take the liberty of extracting a little for our own. It may be taken that, as a general rule, the actual reduction of consumption is inappreciable (owing to the power demand) in the industrial centres; but in the case of residential areas it is in cases fairly considerable. The difference, too, is more marked in the southern and midland counties than in the more northerly latitudes. In Scotland and the northern counties, the variations in load are naturally very small, as the day is comparatively long there, and the saving effected by the Act is therefore relatively small. In Glasgow, for instance, the effect on the load curve is practically negligible, as is also the case in Dundee, Aberdeen, Carlisle, and Sunderland. Speaking generally, the reduction effected soon after the outbreak of war makes the saving of artificial light appear less than it would do in comparison with normal times. Studying the load curves of Belfast, Dublin, and Swansea, these show a distinct diminution of the output for lighting; but, in the case of Dublin and Swansea, it is (our contemporary suggests) questionable whether this does not actually tend to economy, since it reduces the peak due to the evening lighting load, which appears to be the maximum load of the day. No such economy, however, is effected in such cases as Belfast, where the evening load is already less than the morning and afternoon power loads. This tendency to economy by the reduction of the maximum peak may, however, be offset to some extent by the fact that charges are usually higher for lighting than for power, which means that the reduction in revenue is greater than is indicated by the reduction in load. In the case of residential districts, where lighting is the main load, the latter consideration, of course, completely outweighs the former; and these are the districts in which supply authorities lose most heavily by the Summer Time Act. This has evidently been discovered by the Hampstead Borough Council, which (as seen in the previous paragraph) have increased their charges for electricity by as much as 33 per cent. over pre-war rates. Manufacturing districts, on the whole, do not appear to be much affected by the change. This is probably due to the fact that the lighting load is such a small proportion of the whole that the reduction is inappreciable; and this is no doubt accentuated by the amount of overtime being worked at present. In the case of Manchester the estimated reduction in output from the Stuart Street station for the period covered by the Act is equivalent to 1 per cent. of the total output, while the consequent saving in coal is about 600 tons. In the city stations the reduction is estimated at 2 per cent. of the output, with a saving in coal of 300 tons.

Experiences at Smaller Stations.

From reports, the effect of the saving of artificial light upon some of the southern electricity stations of less magnitude is gathered; and these may be taken as representative. The Electrical Engineer of Barnes reports that, since the Act came into force, the output of current has decreased approximately 15 per cent.; and, as the diminution is practically entirely on the higher priced units, the effect on the revenue of the department, will be considerable. At Exeter, it is calculated that the "saving" will mean a reduction of £500 in the income of the department, against which will be set a saving of coal of £125. The Electrical Engineer of the Heston and Isleworth District Council reports that the output in units for lighting purposes has fallen by approximately 200 units per day on week-days and 100 units on Sundays. This, he says, will vary slightly with the period of the year; but it is evident that, in the 142 days during which the new arrangement will be in force, the output for lighting purposes will decrease by approximately 26,000 units. From Ilford comes the report that the Act has affected the undertaking "considerably."

Alternating Currents and Eye Strain.

It is noticeable that a great deal more attention is now being given, by those whose work demands a large application of artificial lights, to their physiological effects; and in all probability this new interest is chiefly due to the increasing amount of defective vision that has followed the long-continued use of unscreened lamps of high and increasing intrinsic brilliancy. This is a very good thing, as perhaps in time there will come out of the research greater wisdom, which will lead people to look upon the quality of light, and the effects of different means of lighting upon eyesight, as cardinal considerations, and convenience and other things as minor ones. An article on the subject of "Alternating Currents and Eye Strain," by Mr. E. A. Salt, appears in the "British Journal of Photography" for July 7; and after reading this those who have to do work demanding close application—such as retouching negatives and finishing prints—will no doubt eschew electric lamps on alternating circuits, and will prefer lights not subjected to the same failings. The article does not pretend to inform us what are the actual effects on the vision of using lamps on alternating circuits; but common sense must tell even those whose knowledge of ophthalmic science is limited that, our eyes not being designed by Nature for a light which sets up some sort of reaction of a vibratory kind, eye strain must occur under such influence when doing work requiring continuous concentration of vision. Strong eyes, Mr. Salt says, may not feel the influence; but strong eyes do not last for ever, and injury may be done without any suspicion being aroused as to its cause. He has experimented in retouching with well-diffused light from Osram lamps on alternating circuits, and found it most trying. Steady but weaker illuminants proved restful by comparison. Experienced mechanical engineers on lathe work have stated that, on turning over from direct current to alternating, they have noticed a decided change for the worse; and other illustrations might be given of expressions of dislike for alternating illumination, when special work involving critical examination, has to be executed. From these and other considerations advanced in his article, Mr. Salt has no compunction whatever in indicting the high voltage metallic filament lamp run on alternating circuit; the charge being "that for all work requiring concentration of vision, it is one of the worst illuminants which can be selected, whether the light be diffused or not."

An Experiment Proving Light Fluctuations.

This is an explicit charge; and practical experience and experiment substantiate it. From an electrical primer, Mr. Salt quotes a paragraph which states that, "if a slowly varying or alternating current is passed through a glow-lamp, the filament will be seen to vary in brightness, following the change of current strength. If, however, the alternations take place more rapidly than about 50 to 60 per second, the eye cannot follow the variations quickly enough, and the lamp *appears* to burn quite steadily. . . . The alternating currents used in commerce in lighting systems reverse about 100 to 200 times every second, so that the lamps incandesced by them burn *quite steadily*, and, in fact, appear just as if they were incandesced by an ordinary unidirectional current. But it is noticeable that arcs supplied with current alternating 100 times per second give a light in which moving objects appear to move jerkily—an appearance which is due to the light really not being quite steady." Mr. Salt disputes the correctness of the statement that incandescent lamps will "burn quite steadily" on alternating circuits, so far as it relates to high-voltage lamps of moderate candle power. Particularly with high voltage metallic filament lamps, persistence of vision masks the fact that the light fluctuates in intensity to a very appreciable extent. To put the question of the fluctuation of luminosity beyond doubt, a 20-watt 200-volt Osram lamp of about 16-candle power, run on a circuit of 50 frequency, was placed behind a narrow slit covered with translucent paper; and an image of the slit was projected by a lens on a dry-plate in a light-tight box, for just short of half a second. The dry-plate, driven by a motor, was rotating twice a second approximately, and recorded the slit image as a circular trail. The image of the slit was also recorded when the plate was stationary. If the light had been steady, a level tint in the line of rotation would have developed up, whereas the diagram accompanying the article shows about 100 very decided "ins and outs" of light—two bands representing one alternation, four bands a period. This diagram, Mr. Salt states, has rather astonished electrical engineers to whom it has been shown. A test of a 200-volt 55-watt lamp of about 50-candle power gave much the same result so far as the eye could judge. A test of a carbon glow-lamp of low candle-power, but with a filament focussed in lieu of a slit in front, also afforded a similar reading. The subject raised by Mr. Salt is undoubtedly one of considerable importance to those who are engaged upon work demanding fixed and finely discriminating application of the eyes, and should certainly be further investigated by independent and competent men, who have both time and the necessary conveniences and instruments for making thorough research.

Trouble with Bar Element Fires.

In this freakish climate of ours, summer weather is being distributed in small doses. We are never allowed now to have long spells of it—or, at any rate, it seems so—probably in order that we may not give way to its influences in the direction of indolence. But with summer time here, the electrical papers are calling attention to what are supposed to be improvements in electric-fires. Everything that comes out in this line is an "improvement," until something shows that it is a failure. The electrical industry, in its heating and cooking branches, has a perfect shoal of failures of appliances which have each had a short spell of happiness as a declared improvement upon predecessors. Not long ago, attention was called to the wonderful bar fires, the basis of which bars was fire-clay or earthenware, with the wire or ribbon element wound on it. Through the brittleness and hygroscopic nature of the base, trouble has resulted from the close contact of the high temperature element. It is stated that there is liability to chemical reaction between the fire-clay and the high temperature element, while as the fire-clay becomes heated its electrical resistance is lowered, and at very high temperatures it becomes a partial conductor. Operated at any heat below a bright red, the troubles do not "seem" to arise; but the public likes a bright glow, and a fire that gives out a high proportion of

radiant heat. Some makers claim that they have produced a clay that has no such troublesome characteristics; and the "Electrical Times" hopes that time will prove that the claim is well founded, for little doubt can exist that some of the clays in common use are quite unsuited for combination with high temperature elements. However, in one form of fires—those made by the Falkirk Iron Company—mica strips are employed for the base of the resistance wires. These are wound for various loadings—the lowest being 250 watts and the highest 420 watts; and the "fires" are made with different numbers of bars. They are spoken of as being "particularly handsome." So far we have only seen illustrations of the fires, and all that need be said is that in respect of beauty, as in many other things, ideas vary.

"Flaming" Electric-Fires.

A writer in "The Times Engineering Supplement" has been captured by what is termed a "flaming" electric-fire. The title, of course, is a deception—like the "half-watt" lamp. The fire does not flame; there is nothing in it to support combustion. There is, however, through the form of construction, a sort of shimmering effect. The new comer is a production of the British Transformer Company, Limited. The heating elements are of a chrome-resistance wire wound to and fro on an arc-shaped steel trough, with mica insulation. They take about 500 watts each, and are set vertically in panels. We will let the captured one be responsible for the further description: "One result of the arrangement is that changes take place in the density, and consequently also in the refractivity of the air, which, entering at the bottom, is gradually heated as it rises up the element; and the differing refractivities of the different layers produce a shimmering effect, similar to that which may be seen along the steel rails of a railway line on a hot day. This, taken with the direct effect of the rising air, where it is allowed to contact with the hot wire screen, permits the production of red or smoky 'flames' at will, and gives body or volume to the flames, which rival those of a coal fire at its hottest. Thus, so far from the fire presenting the monotonous appearance of (say) an electric-lamp radiator, there is a continual play of flickering light and shade over the glowing wires, whence the epithet flaming. About three-quarters of the total heat is radiated direct from the heating elements. Of the residue, part goes to warm the metal in the top of the fire, whence it is again radiated out into the room, and part appears in the form of warm air which, by a special construction, is made to pour out in a horizontal direction." We used to get a lot of that desiccated air with the old type of gas-fires; and it was nearly the death of gas-heating. We shall expect to hear of certain other troubles with the wires as experience accrues.

COAL SENT ABROAD.

A SERIES of tables were published last week, as a Parliamentary Paper, giving details as to shipments of coal abroad from ports of the United Kingdom for each of the years 1914 and 1915. The return, which is a continuation of those for previous years, furnishes a complete record of the coal carried by sea from this country; and, of course, it deals with the year in the latter half of which war broke out, and one complete year of war.

The first table, which constitutes the main portion of the return, shows the export of coal from every port in the United Kingdom to each foreign country and British Possession. The exports from England and Wales were 50,661,274 tons in 1914, and 37,086,620 tons in 1915. Scotland despatched 8,378,309 tons in 1914, and 6,447,940 tons in 1915; while Ireland figures only for a shipment of 297 tons to Norway, in 1914. The grand totals for the United Kingdom are: 1914, 59,039,880 tons; 1915, 43,534,560 tons. As showing the relative activity of the different districts dealing with over 2,000,000 tons, it may be mentioned that last year Blyth sent away 2,028,891 tons; Cardiff, 10,530,634 tons; Hull, 2,344,506 tons; Newcastle, 8,405,628 tons; Newport (Mon.), 3,412,352 tons; Swansea, 3,101,679 tons; and Glasgow, 2,325,481 tons. Sunderland followed closely with 1,970,860 tons.

Another table provides a summary for the two years of the quantities of coal exported from the United Kingdom to the principal groups of foreign countries and British Possessions. From this it is seen that in 1915 as compared with 1914 there was a decrease of 10,776,221 tons of coal sent to the group including Russia, Sweden, Norway, Denmark, Germany, Belgium, &c.; of 1,600,103 tons in the amount which went to the group embracing France, Switzerland, Spain, Portugal, Turkey, &c.; and of 2,128,590 tons in the quantity despatched to Brazil, Uruguay, the Argentine Republic, &c. The total falling-off, as was shown by the first table, was 15,505,320 tons; but the figures quoted are the only ones which exceed a decrease of 1,000,000 tons. Exports of coke and manufactured fuel are similarly dealt with; and this table indicates that there was a decrease in 1915 as compared with 1914 of 172,135 tons of coke sent away from the United Kingdom, and of 382,686 tons of manufactured fuel. The exact export figures were: Coke—1914, 1,182,848 tons; 1915, 1,010,713 tons. Manufactured fuel—1914, 1,607,757 tons; 1915, 1,225,071 tons.

The quantities of bunker coal shipped at ports in the United Kingdom for the use of vessels on foreign voyages, are set forth in a detailed statement which shows that the total amount for 1914 was 18,535,616 tons; the figure for 1915 being necessarily very substantially less, at 13,630,964 tons. The amounts shipped for the use of vessels on coastwise voyages exhibit a corresponding falling off: 1914, 2,391,616 tons; 1915, 2,019,217 tons.

HALKETT'S PATENT GAS AND AIR MIXER.

THE necessity of having a proper proportion when using gas and air under pressure, has occasioned the invention of the appliances known as gas and air mixers. These vary in design and degrees of efficiency; but they all have the same aim—to so adjust the mixture of air and gas as to give complete combustion, with the highest efficiency, at the minimum consumption. Even the most efficient, however, depend for success upon the operator's ability and skill in adjustment. The reason for this is not so much any fault in the mixer itself, as that the control taps require much care in setting each time the appliance is used, and being generally placed some distance from the point of mixing, there is always a loss of pressure at that point.

It, therefore, becomes obvious that, to have absolute control over any proportionate mixture, some means other than the ordinary control taps are necessary; and in this way the Halkett patent gas-mixer [as described and illustrated in the "JOURNAL" for May 30, pp. 462-3] is unique. It can be used for any purpose where heat is required, even to the melting point of steel. When applied to furnaces for annealing and hardening and forging high-class steels, the mixer ensures absolute freedom from oxidation (a matter of importance to tool makers), as it is possible to so regulate and set permanently the mixture for any specific purpose, and yet obtain an oxidizing or reducing atmosphere when required, by means of one simple adjustment of the mixer. As an example, take gas-fired crucible furnaces which are almost invariably worked on a fixed gas consumption, and require more handling than any other class of furnace. The constant adjustment each time a pot is withdrawn tends to worry the operator, who, if in a hurry between casting and refilling his pots, does not give the control taps the attention they require, and becomes indifferent as to whether or not the furnace gives results. This class of furnace distinctly needs permanent adjustment; and when such a furnace is fitted with a mixer like the Halkett patent, the operator is relieved from constant adjustment, as, the mixer being adjustable for both gas and air at the point of mixing, can be permanently set. All that the operator is called upon to do is to open or close the gas or air controls; and, since the proper proportion of gas and air is permanently set, the results are constant.

The mixer can be used on any class of apparatus which necessitates the use of compressed air, and can be worked on high or low pressures—the gas consumption being in proportion to the air pressure used. Many of the mixers are at the present time in use for such operations as welding cylinders, shell-nosing, and optical glass melting, &c., and have proved the claims advanced in their favour. A glance at the section of the mixer given in the "JOURNAL" referred to above will show that the adjustments are all embodied in its construction, and that the proper proportion of gas and air for combustion is under absolute control—being adjustable for both gas and air at the point of mixing.

List of Certified Occupations.

It was stated some weeks ago that a revision of the complete list of certified occupations was in progress. This work has now been done, and the result is available in pamphlet form, at a price of one penny. The list has been made as convenient as possible for reference, and includes an introductory note, general reservations, reservations in particular trades, recommendations, and an appendix setting forth a circular issued by the Local Government Board and the Secretary for Scotland to all local and appeal tribunals with regard to skilled workmen in engineering and shipbuilding trades. The list supersedes all previous ones; but the alterations in, or additions to, that dated May 1 (except verbal changes of minor importance) are printed in heavy type. Attention is drawn to the fact that no man, whether attested or unattested, so long as he rightfully holds a certificate in connection with a war service badge, at whatever date it was issued, and whether he still holds a badge or not, is liable to be called up for service. All certificates of exemption are, however, liable to review in accordance with the regulations and the instructions.

Monazite Deposits of India.—A paper has been contributed by Professor Wyndham Dunstan to the Society of Arts on the work of the Imperial Institute for India. A large number of Indian minerals have, he says, been investigated at the Institute, in order to ascertain their suitability and value for various industrial purposes. One of these is coal, which, the author points out, possesses great possibilities as a factor of industrial importance to India, not only as a source of power, but in connection with the adoption of improved methods of carbonization and the production of liquid fuel, as well as of power gas. Another mineral dealt with was monazite, "of which," remarks Professor Dunstan, "it is now known that India possesses the richest deposits in the world." In view of the previous control of the thorium industry by Germany, he draws attention to the great importance that attached to the discovery of an additional source of supply, under British control.

EXAMINATIONS IN "GAS ENGINEERING," "GAS SUPPLY," AND "GAS-FITTING."

List of Some Successful Candidates.

As will have been gathered from the communication published in last week's issue of the "JOURNAL" from Mr. Walter T. Dunn, the Secretary of the Institution of Gas Engineers, the City and Guilds of London Institute found it impossible on this occasion to supply lists of those who were successful in this year's examinations in "Gas Engineering," "Gas Supply," and "Gas-Fitting." We therefore asked those readers who might be in a position to do so to forward for publication the names of candidates who, to their knowledge, had been successful in passing any of the three examinations. As the result, we are in a position to publish the following lists, which, it is hardly necessary to say, are certain to be incomplete in many respects. We shall welcome any further assistance that may be forthcoming in preparing a supplementary list of names for the next number of the "JOURNAL." The questions set by the Examiner in "Gas Engineering" (Mr. Samuel Glover, of St. Helens) will be found in our issue of May 9, p. 293. Those set by Mr. Walter Hole, of Leeds, in "Gas Supply" were given on May 16, p. 350. The Examiners in "Gas-Fitting" were Mr. H. Kendrick, of Stretford, and Mr. R. Halkett, of Glasgow; and the questions set by them were reproduced in the "JOURNAL" for May 9, p. 293.

GAS ENGINEERING.

FINAL GRADE. First Class.	FINAL GRADE. Second Class.		GRADE I. First Class.	GRADE I. Second Class.	
Barnett, W. A.	Coe, A.	Mabey, G. E.	Bradbury, J.	Champion, A. J.	Hollies, J. R.
Thompson, J. P.	Cronk, L. A.	Mabie, W.		Dyett, G. T.	Jenkins, I. G.
	Dodd, A. P.	Thomas, A. J. O.		Edmonds, F. J.	Seed, G.
	Ineson, W.	Wadsworth, H.		Hayter, A. H.	Stevens, G. J.
	Joyce, J. T.	Wills, A. J.		Hickling, F.	Surman, C. W.
		Wise, W. H.			Sylvester, F. C.
					Walker, R.

GAS SUPPLY.

FINAL GRADE. First Class.	FINAL GRADE. Second Class.	GRADE I. First Class.		GRADE I. Second Class.	
Henton, A. E.	Deane, C.	Ashwood, R. S.	Garrud, T.	Anthony, R.	Lacy, R. J.
Thompson, J. P.	Humphries, A. W.	Bartlett, T.	Holgate, R. D.	Bryant, C.	Locke, G. W.
Wise, W. H.	Thomas, H. R.	Bradbury, J.	Joyce, J. G.	Coaton, W.	Mothersole, G.
		Buttery, G. G.	Millard, F.	Farthing, C.	Pocock, C. H.
		Creedy, L. D.	Prince, R.	Fox, A. L.	Seed, G.
		Davis, J.	Rabbetts, T. H.	Gelleff, A. A.	Stanton, L. V.
		Farthing, F.	Wadsworth, H.	Harris, C.	Smith, C. G.
			West, E. A.		Taylor, H.
			Wood, W.		Tucker, S. A.
					White, F.

GAS FITTING.

FINAL GRADE. First Class.	FINAL GRADE. Second Class.	GRADE I.	GRADE II.		
Fieldhouse, A.	Grimsley, W.	Bradley, W.	Ashwood, R. S.	Jones, A. B.	Morton, S. H.
Millington, F.	Lancaster, C. A.	Bryant, C.	Bartlett, T.	Jones, T.	Pilkington, J.
Power, A. J.	Maule, S.	Davies, T.	Burton, E. P.	Jones, T. A.	Pope, R.
Walker, C. D.		Sargeant, F.	Clare, J.	Joyce, J. G.	Salt, T.
Webb, F. W.		White, F.	Davidson, W.	Lea, W.	Wallace, E.
			Doyle, V.	M'Cartney, W.	Wright, C. I.
				Millard, F.	Wright, W.

GAS ENGINEERS AND CONTRACTORS.

By F. S. CRIPPS, Assoc.M.Inst.C.E.

THE letter from Mr. Maurice Graham in the last issue of the "JOURNAL" opens up the question of whether contractors for gas plant and appliances should be admitted to full membership of a National Gas Institution.

Mr. Graham is evidently under the impression that contractors were, and have been, excluded because of some fancied inferiority or inability to assist in the advancement of gas engineering. Nothing of the kind. It originated in the unfortunate misunderstanding between the late Sir George Livesey and the late Mr. Bray—in which case it was considered that the attitude of the "Trader" was aggressive, and hindered rather than advanced the status and objects of the Institution.

This incident resulted in the severance of many of the leading gas engineers and managers from the Gas Institute and the formation of the "Institution of Gas Engineers." So that it may be said that the gas industry was split into three sections—viz., the two Institutions and the so-called "traders" or "contractors"—all at variance, or at least agreeing to differ on various points. This "house divided against itself" did not stand; and after prolonged discussion the two Institutions were merged into one, under the common title of the "Institution of Gas Engineers," from which (the present) Institution "traders" continued to be excluded from membership.

Although the Livesey-Bray incident was the primary cause of the split between contractors and the Institution, yet it must not be forgotten that there were other considerations which affected the question—such as the sometimes inconvenient importunities of contractors in favour of their own wares at the gatherings of the Association, and the (at one time) openly discussed question of bribery of the gas engineer or manager by the contractor. Actual cases will be recollected by many. Although improper or indiscreet practices might be the fault of the few, it was found difficult to discriminate. The new Institution, therefore, decided to exclude all. The wisdom of this course is not apparent. If contractors desire to bribe, it is by no means necessary to join the Institution in order to do so; and excluding them from its membership would not prevent it. They have a thousand and one ways of "getting at" gas managers, other than through the gates of the Institution. In fact, membership would perhaps act as a deterrent rather than as an incentive to bribery, particularly if any discreditable conduct on the part of a member made him liable to dismissal—as in the case of the Institution of Civil Engineers [see the bye-laws of that Institution.]

The Livesey-Bray incident has long since been satisfactorily laid to rest; and it is to be hoped bribery is extinct. It would, therefore, seem that the way is now clear for the union of all the forces which tend to promote the welfare of the gas industry.

With Mr. Graham's contention, that the contractor for gas-plant is in many cases deserving of recognition, as being of the greatest value in the design and construction of such plant, I am entirely at one. Having myself been trained in the best engineering works (marine), and then for some years with the leading contractors for gas plant, before starting in practice for myself as a Consulting Gas Engineer, I may perhaps be permitted to speak from or for both sides.

Now what can be said for the so-called "gas engineer" who has been confined to a gas-works all his life? If his experience has been obtained on a well-organized and well-designed works (whether designed by contractor or consulting engineer), he is in a better position to acquire an intimate acquaintance with the actual working of the apparatus, and to detect its uses and weak points, than most contractors; and he is therefore in a better position to suggest improvements for attaining the results he seeks than a contractor whose experience is practically confined to the making of the plant. The gas manager is the man to determine the process; the contractor, the man to provide the apparatus for affecting it. The one cannot do his best without the other.

Now what is to be said for the contractor? Why in ninety-nine cases out of a hundred the gas manager cannot hold the candle to him for real practical engineering knowledge and experience. It is only in cases where the gas engineer has been well trained with contractors for many years before entering a gas-works, that he can pretend to vie with them in the designing of plant. The ordinary gas manager has not the opportunity of designing much plant. He is practically restricted to the little required for his own works; whereas the contractor is working-up designs—in every detail—for a multitude of works. More real

engineering passes through a big contractor's hands in a twelve-month than the ordinary gas manager's in a lifetime.

Speaking from experience, I may say that in nine cases out of ten the drawings received from the so-called "gas engineer" are only fit for the waste-paper basket; and unless the designs were licked into shape by the obliging contractor, and fresh drawings made throughout, the plant would be practically unmakable, or would ruin either the contractor or the gas company if persisted in. Rarely, indeed, are the drawings received by the contractor of any use whatever beyond giving a general idea of what is required. Everything has to be re-done; and why? Simply because the gas engineer or manager fancies himself to be an "engineer" when he is nothing of the kind. The work is really done by the contractor, who allows the gas manager to take the credit for it, in view of future work, &c. That contractor would be lacking in business tact who told a gas manager the truth about his designs. Sad to relate, to some extent this criticism applies to the consulting gas engineer.

My point is that, unless a man has been thoroughly trained in engineering workshops and offices where engineering is *done*, and not merely talked and written about (mere paper engineering), he is unworthy of the name of "engineer." On the other hand, a gas-plant works is not the best school. Let the aspirant—together with scientific training—stretch his brain and develop his skill in a higher branch of engineering, as a preliminary, and then descend to a gas contractors' works and offices. He will then be in a condition to grasp everything with ease and avidity, and will soon conquer the various requirements of gas engineering. Then let him penetrate into the mysteries of gas making on the gas-works, and the actual manipulation of the plant. After some years of experience, you should then have a gas engineer worthy of the title. Other qualifications are necessary, but the above are the essentials so far as the engineering aspect is concerned.

By all means welcome the "trader" or "contractor" into the new Institution—if such there is to be—and let him have every opportunity of infusing new life and business into it. He is not all and everything, and does not (I hope) fancy he is; but he is an important factor.

ORGANIZATION OF THE GAS INDUSTRY.

[An esteemed correspondent in the United States, who does not wish his identity to be disclosed, forwards the following article for publication in our pages.—ED. J.G.L.]

WE of the United States are continually being reminded that we are a melting-pot for all races, and by inference at least that our Anglo-Saxon traits are no longer pre-eminently dominant. Be that as it may, the recent articles in the "JOURNAL"—especially the editorial of June 13—indicate a striking similarity between Britain and the States in the manner in which both have so far organized, or perhaps it would be better to say failed to organize, the gas industry.

In both countries the first Gas Association was formed by a few gas managers who realized the benefit possible by the exchange of experiences. The industry was already fifty years old; and forty years more passed before the commercial aspects of the business called for a recognition that the existing Associations failed to grant. As a result with you, the British Commercial Gas Association, and with us, the National Commercial Gas Association. The latter through a manufacturers' section provides for the makers of gas appliances, and therefore corresponds to some extent to the Society of British Gas Industries.

Soon after the formation of the National Commercial Gas Association, began in the United States the now widespread regulation of public utilities through State Commissions. This called for prompt and united action on the part of the gas industry, to educate the new governing bodies, and thus prevent the issuance of many rules—both those unnecessary and those too stringent. The emergency found the Associations unprepared; and there is even now no adequate permanent organization. What happened was really this: Possessing something of your ability to "muddle through," and seizing what lay nearest at hand, we have, in the person of the Secretary of the Public Relations Committee of the American Gas Institute, had for years a most able representative before our various governmental bodies. But (and here comes the rub) this work for the whole industry is his avocation only, as the Institute pays him no salary and enjoys his services solely at the pleasure of his employers, a large gas company. Should he be assigned to other work, there is no one at the Institute headquarters to replace him, nor do their records contain a sufficient history of what has already been accomplished.

There are other instances (of which space will not permit mention here) of good work done for our Gas Associations, in which the voluntary and temporary features were too predominant. Through it all, there runs a lack of sufficient permanent provision for the future. What organization there is, is too dependent on any one individual. In your own experience, I believe that the Gas Companies' Protection Association was formed to protect the industry against unjust legislation with which the existing Gas Associations did not seem able to cope.

On both sides of the water the trouble appears to be the same. The powers that be—either in the Companies or in the Associations—are strangely unaware of the good that would result to the industry, and therefore to all the users of gas, were its interests cared for in each country by one thoroughly representative body which should include in its membership and activities every phase of the business. This body would command the services as voluntary helpers of the best brains, administrative, engineering, and commercial; for the honour to be gained, and the good to be accomplished, would appeal alike to the ambitious and to the disinterested. Again, its financial resources would suffice for a headquarters staff, which would compare favourably in ability with that of any first-rate company, and be headed by a Secretary whose yearly salary, in this country at least, should not be less than $7000. Such a staff would insure the doing of many things not now possible, not the least of which would be the better marshalling of the volunteer aides, and the prevention of much present duplication of effort. At the start, there would be increased funds for research work; and as the new organization justified itself, additional money would be forthcoming.

Is the above only a dream? Some of us here are trying to make it a reality; and, from reading your pages, I judge that the spirit of unrest is abroad with you also. Let us hope for a speedy consummation of our mutual desires.

THERMAL PROBLEMS FOR GAS ENGINEERS.

III.

By NORTON H. HUMPHRYS, Assoc.M.Inst.C.E., F.C.S.

TERMS OF WEIGHT AND OF MEASURE.

A CONSIDERABLE amount of confusion and liability to error arises, at times, by reason of the indiscriminate use of terms of weight or of measure adopted to suit convenience at the moment, rather than on the lines of any recognized rule or plan. Frequently it is next to impossible to establish a definite basis of comparison between the two; and this applies both to commercial transactions and to laboratory or scientific investigations. Every leading line of business has its own independent laws and customs in this respect, developed in the course of time as labour or time-saving expedients. These advantages are considered to over-ride the difficulties arising from the existence of a large number of terms or standards; and the "tables" that are usually such an abomination to the average school-boy serve as an intellectual exercise for developing the mental capabilities of some future gas engineers and managers.

The weight of a bushel of coal or coke may vary to the extent of 100 per cent., according to: (*a*) The composition, especially with reference to the quantity of heavy material or incombustible matter contained in it; and (*b*) the average size of the individual lumps or fragments of which it is composed. A bushel of fine dust will lie more compactly than, and possibly weigh twice as much as, a similar bulk of exactly similar material in blocks averaging a content of (say) 4-inch cube. For this reason, the old-fashion measures of the chaldron and the bushel have entirely disappeared from our coal and carbonizing books, and are practically obsolete as applied to coke. A similar tendency in favour of terms of weight is noticeable in other directions. Even the different conditions of cast and rolled, in the case of metals, have an effect on the relative bulk and weight.

There is a fixed proportion between the weight and bulk of pure liquids, or of mixture of them in known and definite quantities. A gallon of pure water at 60° Fahr. will always weigh 10 lbs.; but with regard to liquids of impure character or variable composition, such as tar, oil, or spirits, they may not only vary to an important extent in respect to specific gravity, but the same is not necessarily a safe index as to their composition. They may also acquire a permanent variation by exposure to the atmosphere or to slight variations of temperature and pressure, either by reason of loss of volatile constituents through evaporation, or absorption of water. We have an example in the anomalous custom for estimating the ammonia content of ammoniacal liquor according to the increase in specific gravity, notwithstanding the fact that aqueous solutions of pure ammonia become lighter than water in proportion to increase of strength. It is found more satisfactory in practice to buy liquids by weight in preference to measure. The purchase of gas oil at a fixed price per gallon, but accompanied by a special stipulation as to the specific gravity and a *pro ratâ* adjustment for variation, is practically a transaction in terms of weight.

There is also a fixed proportion between the weights and the bulks of pure gases, or definite mixtures of such gases. But terms in common use—such as coal gas, carburetted water gas, oil gas, furnace gas, or sewer gas—are generic, and indicate a class rather than an individual compound. Either class may vary widely in respect to all or any of its physical properties, and the specific gravity is not necessarily an indication of composition or character. The difficulties connected with the accurate determination of the weights of gases are such that, for all practical purposes, they are dealt with in terms of measure—the cubic foot being the established standard in this country. In manufacturing processes, where the staple material is purchased in terms of weight and the chief product is sold by measure, as in the gas industry, fairly accurate methods of comparison are a necessity.

Standard Conditions of Temperature and Pressure.

We have seen the need for considering conditions of temperature in connection with all questions relating to the bulk or volume of gases, and some confusion is caused by the use of more than one standard. The student is at times perplexed by differences in respect to the physical properties of gases, as quoted by various authorities, and may be led to assume that our general knowledge on such matters is somewhat erratic. The standard of 0° C. and 760 mm. pressure is universal on the Continent, and is rapidly making its way in England for experimental and scientific purposes, both on account of general utility and of the certainty with which the temperature of 0° C. (32° Fahr.) can be ascertained, by the use of melting ice. It also reduces the liability to error, by reason of the unsuspected presence of water vapour, the complete removal of which is difficult. In England, we retain the standard of 60° Fahr., or 62° Fahr. and 30 inches for all practical purposes, which have nothing in their favour, apart from the fact that they approximate to the average climatic conditions in this country. The barometric pressure of 760 mm. is equivalent to 29·922 inches of mercury, so that the difference between this and 30 inches is so slight that for all ordinary purposes it may be disregarded.

The Continental system assumes that the gas is in the pure or "dry" condition. But with English standards, either "dry" or "saturated" condition may be, and is, indiscriminately used; the former being preferred in the laboratory, and the latter for practical purposes—another example of convenience rather than of method. Matters might be simplified by regarding the water vapour as what it really is—an accidental foreign body or impurity, in no sense a part or component of the gas under examination. The gas could be stated as so much per cent. pure, according to the quantity of water vapour found by experiment to be present. Frequently one gets tables of calorific values in text-books, stated in terms of British thermal units or of calories—the British thermal unit being the quantity of heat required to raise 1 lb. of water at 60° Fahr. to 61° Fahr., and the "C" that used in raising 1 gramme of water at 0° C. to 1° C. (small calorie), or 1 kilogramme to a similar extent (large calorie). The large is equivalent to 1000 "small" calories, and is found the more convenient for practical use. As a rule, the calorie refers to the Continental conditions, and the B.Th.U. to the British.

Table II.—*Bulk of 1 lb. Weight of Gases at Various Standards of Temperature and Pressure.*

—	32° Fahr. and 760 m.m. Dry.	60° Fahr. and 30 in. Dry.	60° Fahr. and 30 in. Saturated.	62° Fahr. and 30 in. Dry.
Hydrogen . . . cubic feet	178 80	188 68	192·36	188 04
Methane . . . ,,	22·39	23 32	24·09	23·24
Acetylene . . . ,,	13 79	14·52	14·83	14·47
Carbon monoxide ,,	12·80	13·48	13·77	13·43
Ethylene . . . ,,	12·80	13·46	13·77	13·41
Nitrogen . . . ,,	12·75	13·42	13 72	13·37
Oxygen . . . ,,	11·20	11·79	12·05	11·75
Carbon dioxide . ,,	8·15	8·52	8·76	8·49
Air . . . . . ,,	12·39	13·03	13·34	12·99

Table II. shows the effect of different standard conditions as regards the bulk of gases; and as the extreme differences are about 7 per cent. of the bulk, it is evident that, before consulting or abstracting data from such tables, one should be quite clear as to the standard conditions.

"Absolute" and "Relative" Terms of Weight or Measure.

Weights and measures may be regarded in two different senses—as a definite unit of proportion, or as compared with the weight of an equal bulk of any other substance. Such an expression as "one gallon of gas oil, specific gravity ·850," combines both the absolute measure and the relative weight. The absolute term refers to one fixed quantity alone. A pint, a gallon, a pound, or a ton indicates a fixed quantity; but specific gravity ·850, is understood to be that proportion of the weight of a similar bulk (one gallon) of water. The relative terms are independent of fixed quantities. The "equal bulk" may be a pint, a litre, a gallon, or any convenient measure of capacity, without affecting the result. The standards for absolute weights are the system in use—ounces, pounds, &c., in this country and multiples of the gramme in France. Those in general use as a standard for relative weights (densities, specific gravities) are hydrogen, air, and water. The two former are used for gases, and the latter for liquids and solids. Of the absolute weight, the relative weight, and the bulk, given any two terms the third can be calculated by simple proportion. A very convenient relation between weight and measure is afforded by the fact that one gallon of water weighs exactly 10 lbs. One tenth part of a gallon (deci-gallon) weighs one lb.; and this may be divided in 1000 parts, each of which weighs seven grains.

The expression "one gallon of gas oil, specific gravity ·850," states two of the terms. The third is easily arrived at, thus:

$$\cdot 850 \times 10 = 8 \cdot 5 \text{ lbs.}$$

Table III. contains information as to absolute and relative weights of gases, to which it will be necessary to refer later on; and it supplies the two terms above mentioned, from which the third can be calculated.

Table III.—*Specific Gravity and Weights of Gases at 60° Fahr. and 30 Inches.*

—	Formula.	Spec. Grav. H = According to Formula	1 Observed.	Spec. Grav. Air = 1 Observed.	Weight of 1 Cub. Ft. Lbs.	Cub. Ft. in 1 Lb.	Weight of 1 Cub. Ft. Grains.
Air . . .	..	..	14·33	1·000	0·0767	13·03	536·9
Oxygen .	O	..	15·87	1·017	0·0848	11·79	593·6
Nitrogen .	N	..	13·914	0·971	0·0745	13·42	521·5
Carbon monoxide	CO	13·93	13·905	0·968	0·0742	13·48	519·18
Carbon dioxide .	CO_2	21·97	21·83	1·529	0·1173	8·52	820·9
Hydrogen .	H	1·000	1·000	0·696	0·0053	188·68	37·09
Methane .	CH_4	8·00	7·98	0·554	0·0429	23·32	300·12
Ethane . .	C_2H_6	15	14·9	1·040	0·0796	12·53	557·2
Propane .	C_3H_8	16	21·888	1·523	0·1170	8·55	819·0
Butane . .	C_4H_{10}	29	29·87	2·085	0·1600	6·25	1120
Pentane .	C_5H_{12}	36	36·95	2·580	0·1990	5·04	1393
Hexane.	C_6H_{14}	43	42·94	3·000	0·2420	4·14	1694
Heptane .	C_7H_{16}	50	49·88	3·483	0·2720	3·69	1904
Ethylene .	C_2H_4	14	13·97	0·97	0·0742	13·46	519·71
Propylene .	C_3H_6	21	20·95	1·461	0·1120	8·92	784
Butylene .	C_4H_8	28	27·94	1·950	0·1500	6·68	1050
Amylene .	C_5H_{10}	35	34·9	2 435	0·1870	5·35	1309
Acetylene .	C_2H_2	13	12·97	0·905	0·681	14·52	4767
Naphthalene . .	$C_{10}H_8$	64	63·6	4·44	0 360	2·93	2520
Benzene .	C_6H_6	39	38·91	2·77	0·2138	4·70	1496·6
Toluene .	C_7H_8	46	45·87	3·27	0·2520	3·98	1764
Of Liquids and Solids.							
Water . .	..	..	10,612	814	62·500	0·0016	..
Fire-brick .	..	..	28,653	2199	168·750	0·00059	..
Iron . . .	..	..	83,300	6393	493·725	0·00020	..
Lead . .	..	..	120,534	9239	710	0·00014	..

Note.—Some of the heavier hydrocarbons are not gaseous at ordinary temperatures. Like water, they exist to an extent limited by the "saturation point" as vapours, at a temperature lower than their condensation or boiling point.

The corresponding particulars in respect to a few common substances other than gases are added at the foot, for the purpose of illustrating the relative small weight, and consequent large bulk, of gases as compared with solids and liquids, which is the cause of much inconvenience in practice. The cost and the area occupied by the storing and distributing plant of a gas undertaking is a case in point. We shall see later that it also has an important bearing on the physical properties of the three forms of matter respectively. The specific gravity of water (air = 1) is 814 and (H = 1) 10,612; the corresponding figures for lead being 9239 and 120,534.

(To be continued.)

ASSOCIATION OF BRITISH CHEMICAL MANUFACTURERS.

The support that has been accorded to this Association during the short time the movement has been on foot, affords convincing evidence that British chemical manufacturers are fully alive to the necessity for organization and co-operation in the widest sense. A number of the leading manufacturers have already signified their intention to become members of the Association; and every day brings fresh adhesions. Some doubt having been expressed that the Association might become too capitalistic in nature, especially when it became known that the subscription was to be based on the capital of the member firms, it may be stated that each firm joining the Association will have only one vote in its affairs, irrespective of the amount of subscription paid. Provided that adequate support from British manufacturers is forthcoming, the Association will undoubtedly prove to be of the greatest assistance and benefit to the chemical industries of the country.

The affairs of the Association are in the hands of a strong Provisional Committee, which includes the names of Messrs. E. Frankland Armstrong, Charles Carpenter, D.Sc., M. O. Forster, F.R.S., Norman Holden, Sir Alfred Mond, Bart., M.P., and Sir William Pearce, M.P. The Committee have prepared a draft Constitution and rules of the Association, copies of which can be obtained from the Acting Secretary, Mr. T. F. Burton, Broadway Chambers, Westminster, S.W.

The Quarterly Index.—In accordance with the arrangement made last quarter, and referred to in the "Journal" at the time, copies of the index are now supplied to subscribers only on application. Those whose names are already on the list have had sent to them the index for the volume April to June; and a copy will be sent to others who may intimate their wish to be included in the list.

CALCULATION OF STORAGE TANK CONTENTS.

A USEFUL AND QUICK METHOD.

By Kenneth Norton.

In all chemical and gas works the use of liquids is necessary, and the employment of storage tanks invariable. Whether it be for purposes of periodical stocktaking of the finished products of manufacture or for the regular guidance and check of working operations, it will always be a convenience, not to say a necessity, to have calibration data arranged for the various vessels in constant use.

In many works the assortment of tanks will be very diverse, comprising: (*a*) The square tank, (*b*) the rectangular, (*c*) the circular, (*d*) the cylindrical (horizontally placed).

With the first two types (*a*) and (*b*), the calculation of the contents is quite simple—viz.:

Contents of tank (in gallons) = I. $L \times B \times D \div 277{\cdot}3$ (dimensions in inches)

or II. $L \times B \times D \times 6{\cdot}23$ (dimensions in feet)

Where L = length and B = breadth of tank, while D = depth of liquid therein.

Again, with circular tanks the calculation is simple:

Contents of tank (in gallons) = I. $D_m^2 \times 0{\cdot}7854 \times D_p \div 277{\cdot}3$ (in inches)

or II. $D_m^2 \times 0{\cdot}7854 \times D_p \times 6{\cdot}23$ (in feet)

Where D_m = diameter of tank and D_p = depth of liquid contained therein.

When, however, the tank is a partially-filled horizontally-placed cylinder—usually an old Cornish or a Lancashire boiler with the flue tubes removed—then the problem of working out its contents by a mathematical process is complicated, cumbersome, and lengthy.

The writer, having a large number of such tanks under his supervision, was led to design several charts in order to simplify the work that these over-frequent calculations entailed. These charts were eventually embodied on one sheet made up of four sections; the whole arrangement forming a rapid and compact table for the required purpose.

The appended diagram, depicting the chart, will appeal to numerous interested readers, serving as it does for any tank up to 10 feet in diameter and up to 10,000 gallons of total storage capacity.

It is advantageous for the individual reader to draw up a fresh chart to suit his particular requirements; and for this purpose the full data are given, enabling this to be done without difficulty.

Calculating the Total Capacity of Tank.

In the top left-hand quarter of a large piece of squared paper is drawn the graph representing the relation between the diameter of a circular tank and the capacity per foot on the straight—*i.e.*, mark the diameters to the required range and scale along A O, increasing from A to O. Plot each point from the co-ordinates given in Table I. according to the scale required—the diameter horizontally and the volume vertically. [The figures are given in feet in the illustration, though, of course, inches may be recorded if preferred.]

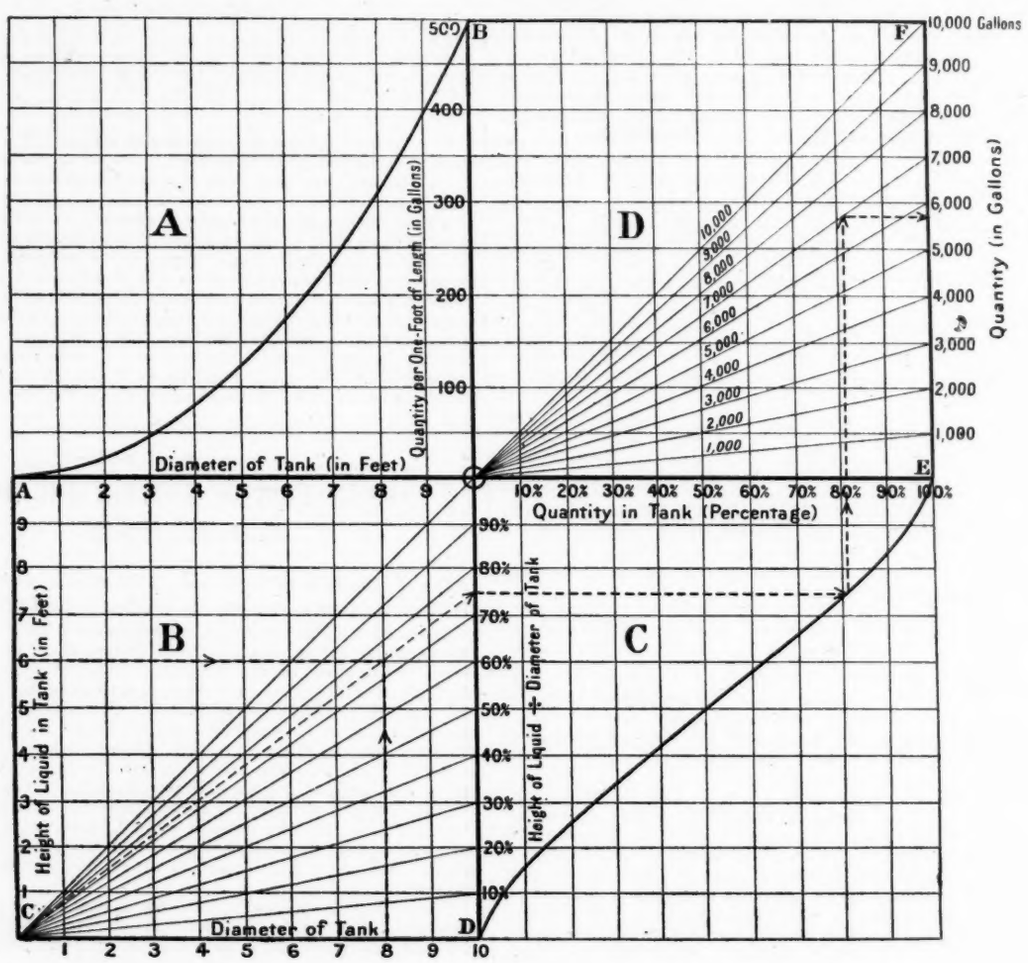


Table I., *for Chart A.*

Diameter.	Gallons.	Diameter.	Gallons.
0 ft. 6 in.	1·2	5 ft. 6 in.	148·1
1 ,, 0 ,,	4·9	6 ,, 0 ,,	176·2
1 ,, 6 ,,	11·0	6 ,, 6 ,,	206·8
2 ,, 0 ,,	19·6	7 ,, 0 ,,	239·8
2 ,, 6 ,,	30 6	7 ,, 6 ,,	275 3
3 ,, 0 ,,	44·1	8 ,, 0 ,,	313·3
3 ,, 6 ,,	60·0	8 ,, 6 ,,	353·6
4 ,, 0 ,,	78·3	9 ,, 0 ,,	396 5
4 ,, 6 ,,	99·1	9 ,, 6 ,,	441·7
5 ,, 0 ,,	122·4	10 ,, 0 ,,	489·5

Table II., *for Chart C.*

Height of Liquid.	Quantity.	Height of Liquid.	Quantity.
5	1·9	55	56·3
10	5·2	60	62·6
15	9·4	65	68·8
20	14·2	70	74 7
25	19·6	75	80·4
30	25·3	80	85·8
35	31·2	85	90·6
40	37·4	90	94·8
45	43·7	95	98·1
50	50·0	100	100·0

On joining-up all these points the curve A is obtained, which shows for each value of D_m the equivalent $D_m^2 \times 0{\cdot}7854 \times 6{\cdot}23$. This curve A is used for calculating the total capacity of the cylindrical tank; the figures on O B giving the quantity per foot of tank length. Thus, to tell the contents of a tank 8 feet in diameter by 22 ft. 4 in. long, find the 8 feet point on A O, and trace its perpendicular until reaching the curve, then follow a horizontal from this point to the line O B, which gives the figure 313·3 gallons. This, being the content of 1 foot, is multiplied by 22·33 (the length), giving a total capacity of 6996 gallons.

Having obtained the capacity, it is now necessary to work out the

CONTENTS OF A PARTIALLY-FILLED TANK.

For this purpose the charts B, C, and D are used; and the calculation is conveniently divided into three sections.

(*a*) To find what relation the depth of liquid in the tank bears to the diameter of the tank—*i.e.*, depth or height (obtained by dipping) divided by the diameter.

(*b*) To find the proportion of the tank contents corresponding to *a*.

(*c*) Calculation of volume of liquid represented by *b*.

(*a*) Along C A make divisions equivalent to the range of tank dips, and on C D divisions equivalent to the tank diameters. In order to find the percentage depth represented by 6 feet in an 8 feet diameter tank, find the 6 feet mark on C A and trace it horizontally until it meets the perpendicular erected at the 8-feet mark on C D. Through this new point a line is projected from C to meet the boundary D O, upon which are marked the percentages. In this simple case, the result is 75 per cent. Oblique lines from C to the points every 5 or 10 per cent. on D O serve as a guide, and will obviate the use of a straight-edge each time.

(*b*) For finding to what contents this percentage is actually equivalent, the figure is traced horizontally from its position on O D until it reaches the curve C. A perpendicular is raised from this point to meet O E at the required figure—in this case 80·4 per cent. Data for plotting the curve C are given in Table II.

(*c*) Having now the contents of the partially filled tank expressed as a percentage of its total capacity, the value may be worked out by a simple multiplication sum, or, preferably, by reference to Chart D. Trace the figure up vertically till it reaches the oblique line representing the total tank capacity, and from this point extend a horizontal to E F; thus obtaining the result. In this instance, it will be 80·4 per cent. of a 6996 gallon tank = 5624 gallons.

The method after being used a few times becomes quite familiar, and its speedy manipulation is only a matter of practice. Given the diameter and length of any tank and the depth of liquid contained, it is only the work of thirty seconds to read off the volume of liquid contained therein. The accuracy of the calculation is necessarily somewhat dependent upon the size of the chart used—obviously a larger scale being more easily and delicately interpreted. The writer can recommend the scale of 10 inches for each section—that is, a 20 in. by 20 in. chart of squared paper. This answers well for all tanks up to 10 feet diameter, with a total capacity of 10,000 gallons. Doubtless each individual will determine the most suitable range according to the dimensions of his own particular plant; but for smaller vessels the range 0 to 5 feet diameter and up to 4000 or 5000 gallons is to be recommended. If the finished sheet is pasted upon a stiff mill-board backing and carefully varnished after sizing, it will last indefinitely, and soon becomes a much-appreciated help.

Particularly of value is the arrangement when calibrating a tank for every inch of its depth. This is often required for receiving tanks on distilling plant, &c. In the case of a 5-feet diameter tank, it is clear that sixty separate calculations will be necessary. This is an unpleasant and tiresome task by ordinary mathematical methods, whereas it is something less than half-an-hour's work by the use of the arrangement described.

SOME PRACTICAL CONSIDERATIONS OF DOWN-DRAUGHT.

By THOS. NEWTON, of Hereford.

THE third report of the Joint Committee of the Institution of Gas Engineers and the University of Leeds on "Ventilation Research" contains the results of certain experiments on down-draught that are of vital interest to all who are intimately concerned with the fixing of gas apparatus requiring flue-pipes. The problem of down-draught bristles with difficulties, mainly because so many disturbing and elusive factors are encountered in actual practice—factors which would be difficult, if not impossible, to reproduce in any set of laboratory experiments. Therefore, the decision of the Joint Committee to deal with this admittedly obscure and complex problem in its simplest form—except as a prelude to a series of major experiments—is a little unfortunate, since certain disturbing, and oftentimes decisive, factors are thereby necessarily ignored or else insufficiently considered. The paucity of original information embodied in the report is probably solely due to the deliberate elimination of those disturbing factors which offer so much food for thought, and which anyhow have to be taken into consideration in the ultimate practical result.

The Joint Committee's dogmatic and somewhat ambiguous conclusions do not seem to be warranted by the recorded evidence, since it is a questionable procedure to achieve certain results by eliminating disturbing factors, and then to generalize what will take place against the side of a house in the presence of those factors. "Thus," we are told, "in practice it is a common thing to see a flue-pipe from a gas-fire or gas-stove fixed up the side of a house without extending to the lower level of the roof. Obviously, when the wind blows against the side of the house where the flue is placed, strong down-draught will be produced from an increase in pressure around the top of the flue; and this cannot be prevented by any form of cap placed on the flue. The only cure is to raise the flue considerably above the level of the roof. Many down-draughts are, however, preventible by any construction of chimney cap in which currents are deflected in a manner consistent with the indications of the experiments just described."

With all deference, the submission is herewith made that these conclusions are not justified by the simple and limited nature of the recorded experiments upon which they are based. Three definite, and to some extent mutually destructive, assertions are here made—viz., that "down-draught cannot be prevented by any form of cap placed on the flue;" that "the only cure is to raise the flue considerably above the level of the roof;" that "many down-draughts are, however, prevented by any construction of chimney cap in which currents are deflected," &c.

The first assertion has been disproved in scores of cases under actual working conditions; while the second is modified, if not discounted altogether, by the third assertion—indeed, the latter assertion is meaningless in the presence of the first two. If the Joint Committee conclude that "down-draught cannot be prevented by any form of cap placed on the flue," it is difficult to understand how the Joint Committee can also conclude that "many down-draughts" can be so prevented by certain chimney caps, since one conclusion flatly contradicts the other.

If "in practice it is a common thing to see a flue-pipe from a gas-fire or gas-stove fixed up the side of a house without extending to the lower level of the roof," might it not have occurred to the Joint Committee that possibly the great majority, if not all, of these flue-pipes were adequately performing their allotted functions when fixed in this position, and that therefore, somehow or other, the conclusions of the Joint Committee did not always apply? It is inconceivable that the common practice (whatever it may be) stereotypes conditions which result in down-draught. If this were so, the makers of gas-fires and gas-stoves would all have a sorry tale to tell. But no one can pretend, nowadays, that the common practice followed in the fixing of gas-fires and gas-stoves necessarily condemns their users to the annoyance and unpleasantness of down-draughts as a direct consequence. As a matter of fact, the growing popularity of gas-fires and gas-stoves is remarkable and eloquent testimony to the contrary.

Probably none would venture to criticize the Joint Committee's action in disregarding, or rather eliminating, disturbing factors, always provided that the conclusions reached were definitely stated to apply only to those conditions where these selfsame disturbing factors were non-existent. Otherwise, the conclusions are obviously drawn from insufficient premises, and therefore illogical. It is quite conceivable that some of the disturbing factors which are encountered in actual practice militate against the prevalence of, and in some cases entirely neutralize what would in other circumstances be, a positive down-draught; and it would be rendering the gas industry an inestimable service if these conditions could be fully investigated—although the difficulties inherent in this problem are thoroughly appreciated. A knowledge of the conditions which tend to thwart down-draught—even though they do not induce up-draught—is quite as important to the practical man as a knowledge of the conditions which produce down-draught; and in referring to a knowledge of these conditions, it is understood that the disturbing factors must be taken into consideration. It would certainly be inadvisable to advocate the termination of the flue-pipe below the level of the roof in every conceivable case; but it is also inadvisable, and impracticable, to lay down a standard in conformity to which the flue-pipe of a gas-cooker (say) should be raised "considerably above the level of the roof" in every case—particularly when hundreds of instances can be cited where this is entirely unnecessary.

Since many flue-pipes that are connected with gas apparatus pass through outside walls (practically at right angles to the latter), and then extend in an upward direction for a short distance, afterwards terminating in a cowl, it would be highly interesting and instructive to have the results of a series of experiments conducted under these conditions. What, for example, is the effect of substituting an open ended T-piece for the elbow or bend, just where the direction changes from the horizontal to the perpendicular? And what causes this substitution to cure a down-draught in some localities and produce one in others? What are the relative advantages and disadvantages of using different types of cowls; and which types tend to deflect currents in a manner consistent with the indications of the Joint Committee's experiments?

Among practical men many devices have been invented and evolved that successfully combat down-draught; and these are not confined solely to down-draught in flue-pipes. What will cure down-draught in one locality may not cure it in another; but the important point is that it can invariably be cured, and in directions other than those indicated by the Joint Committee. Evidently this is where the disturbing factors come into operation; and a fuller knowledge of these would be heartily welcomed by all concerned.

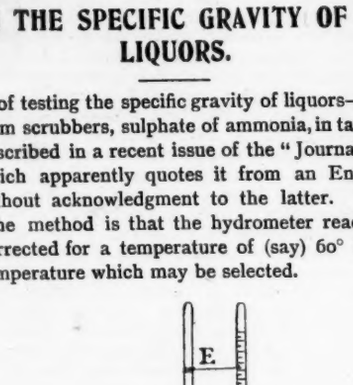
Down-draught is occasionally encountered in brick chimneys

where all the indications appear to be most favourable for an up-draught, and where the chimneys are raised considerably above the level of the roof. In rarer cases, the phenomenon of both down-draught and up-draught is observed to be operating in the same chimney at one and the same time—the down-draught descending along one side of the chimney, and the up-draught ascending along the other side. In such a case the cross section of the chimney is obviously too large; and the remedy is apparent. Where a gas-fire is to be fixed in front of an existing coal-grate, the simple expedient of fixing a sheet of iron in front of the grate opening and cutting a hole in it to accommodate the nozzle of the gas-fire, has been known to convert a positive down-draught into a slight up-draught.

These, then, are but a few considerations of an admittedly complex problem; and they are offered solely with a view to stimulate further research—particularly as regards disturbing factors—in connection with a subject of absorbing interest to most practical men in the gas industry.

TESTING THE SPECIFIC GRAVITY OF MOVING LIQUORS.

A method of testing the specific gravity of liquors—such as the ammonia from scrubbers, sulphate of ammonia, in tar distillation, &c.—was described in a recent issue of the "Journal des Usines à Gaz," which apparently quotes it from an English source although without acknowledgment to the latter. The special feature of the method is that the hydrometer reading is automatically corrected for a temperature of (say) 60° Fahr., or for any other temperature which may be selected.



The arrangement is shown in the illustration, where A represents the vessel through which the stream of liquor is passing, and C a hydrometer placed in it. The small auxiliary vessel B is attached to A, so that the temperature of the liquid in both will be the same. In this second vessel there is also a hydrometer D, similar in every respect to that in A. The hydrometers are placed within guides, so that they rise and fall exactly parallel with each other.

The principle of the method is that the reading of the gravity of the liquid in A is made, not according to the height of the stem above the liquor, but according to the height on a second hydrometer scale attached to an instrument immersed in a liquid of constant gravity and having the same coefficient of expansion as the liquor which is being tested. It is convenient that the liquor in B should have a gravity about mid-way between the extremes of gravity which the liquor passing through A may possess. It is not important what this gravity is exactly, so long as it remains constant. The level of the liquid in A and B requires to be precisely the same, to which end it is advised to have a thin layer of (say) a heavy gas oil on the surface of B, in order to counteract evaporation.

The scale on the hydrometer in A is obliterated with a little black varnish; that of D is removed and replaced by a special scale. This latter is made as follows: The hydrometer C is floated in A at a temperature of 60° Fahr.; and a light index finger E is attached to it—the finger ending in a light metal ring which encircles the stem of the hydrometer D. A small piece of wire is attached elsewhere to the stem of this latter, in order to compensate for the extra weight of the finger. The position of the finger on D is then marked temporarily with ink on the glass stem—the mark indicating the actual gravity (otherwise ascertained) of the liquid under test. The experiment is repeated with two or three other solutions of different gravities introduced into A, and a series of marks thus obtained on D. Then, in accordance with this arrangement, if the temperature of the two liquors falls below 60° Fahr., the gravity of each of them increases; and as this increase is the same for both liquids, and as the hydrometers are identical, the extra length of stem above the surface of the liquors will be the same in each case. The mark indicated on D by the finger attached to C will, therefore, remain exactly the same—that is to say, its indications will not be affected by change of temperature, but only by changes in the specific gravity of the liquid in A.

The hydrometer D, having been provisionally graduated on the outside, the tip of its stem is marked with a file, broken off, and a paper scale, divided in accordance with the densities obtained in the tests, is inserted—intermediate figures having been obtained by interpolation. Before sealing the broken end of the stem, the hydrometer requires to be adjusted by inserting a few grains of sand, in order to compensate for the weight lost by the removal of the glass tip.

AMERICAN GAS CENTENARY.

Celebration in Baltimore.

The Gas Centenary celebrations in Baltimore, on the 16th and 17th ult., took various forms, one of them being the unveiling at Peale's Museum (a photograph of which was given in the "Journal" for June 27) of a bronze tablet commemorating by the following inscription the centenary.

PEALE'S BALTIMORE MUSEUM.

A PIONEER ART HISTORICAL AND SCIENTIFIC MUSEUM
ERECTED 1813 BY REMBRANDT PEALE
GAS LIGHTING DEMONSTRATED JUNE 13 1816
OCCUPIED AS CITY HALL 1830—1875

REMBRANDT PEALE
1778—1860

DISTINGUISHED MARYLAND ARTIST
NATURALIST AND TECHNOLOGIST
FOUNDED THE FIRST GAS COMPANY
IN AMERICA JUNE 17 1816

THIS TABLET COMMEMORATES
THE
1816 - AMERICAN GAS CENTENARY - 1916

CONSOLIDATED GAS ELECTRIC LIGHT AND POWER
COMPANY OF BALTIMORE.

On the evening of June 16, under the auspices of the Johns Hopkins University, there was a gathering in M'Coy Hall, presided over by Mr. F. J. Goodnow. The speakers included Mr. Jansen Haines (the President of the National Commercial Gas Association), Mr. J. E. Aldred (financier, banker, and promoter), Mr. Walton Clark (President, Franklin Institute), Mr. L. H. Baekeland (winner of the Perkins Medal), and Mr. A. Graham Glasgow.

An Address by Mr. Glasgow.

After remarking that the introduction and development of gas in America was left entirely to private enterprise and initiative, Mr. Glasgow went on to say that all now agree that gas service should be a local monopoly; and everyone also agrees that a monopoly should be subject to reasonable regulation. But, inasmuch as gas is a great public convenience, it vitally concerns the public to provide regulation which will ensure that the gas industry is continuously stimulated to higher efficiency, and encouraged to seek and develop new and broader fields of usefulness. Moreover, gas is not a public necessity, but merely a public convenience; and, even if not subjected to direct competition in kind, is nevertheless a competitive business, exposed to all vicissitudes of competition, including obsolescence and possible loss of investment. For instance, as the result of natural gas competition, the present market value of gas securities of the second city of the State of New York is but one-fourth of the cost of structural reproduction of the plant. In fact, most people are surprised to learn that gas, generally, is still able to hold its own against the magic development of electricity, on the one hand, and kerosene on the other—not to speak of natural gas. And they are right to be surprised; for it has demanded surprising effort from those who are responsible for the present status of the gas industry. No industry is drawing more exhaustively on the world's resources of science and technology than is the gas industry of to-day; no industry is now administered with greater ability and initiative; and no industry practises community of interest between consumer and producer to so remarkable an extent. This technical, administrative, and financial talent is serving in gas channels in the expectation of obtaining a return equal to the net market value of such services in other lines of endeavour; and if such fair return, when otherwise earned, be withheld by unreasonable legislation, this talent will inevitably desert the gas business for other channels of similar usefulness but greater compensation. The aim, therefore, should be to provide regulation which will leave the gas industry attractive to technical, administrative, and financial talents, and thus ensure its continued maximum usefulness as a public convenience, while protecting consumers against

paying for such service more than the fair market value, all things considered.

The Sliding-Scale.

British experience of the past fifty years in successful gas regulation offers a practical solution of this complex problem; but our legislators are not much inclined to profit by the experience of other nations. They seem to prefer trial and error of their own devising; and they certainly provide us with plenty of the latter. When England originated the system of regulated monopoly for gas undertakings, she recognized the rights that private enterprise had lawfully acquired in establishing and developing gas businesses, and selected 10 per cent. as a fair "standard dividend" on capital invested at that time. To stimulate higher administrative efficiency, a sliding-scale was added, under which five-sixths of all savings now go to the gas consumer and one-sixth to the gas company owner. In the case of the London Companies, this resulted ultimately in dividends of some 15 per cent. upon this "original" capital. The sliding-scale is merely a legalized and specific expression of that community of interest between consumer and producer which, in private enterprise, finds expression in the policy of quick sales and small profits as the soundest of all business principles.

All new stock issued from the date of this legislation has to be sold by auction; and the whole of the sum realized must be invested in the gas undertaking. Hence, the respective municipalities or gas consumers could buy this new stock, if they so desired, at the price of issue, and thus own, at actual structural cost, all the growth of the gas industry subsequent to the date of this legislation.

The joint aim of this British legislation was to safeguard both the future of the gas consumer and the then vested rights of the gas owner—to prevent future melon-cutting, while avoiding retroactive legislation that impaired existing property rights; and, as compensation for subjecting gas companies to such rate regulation, Parliament gives them a local monopoly.

Where British municipalities have purchased gas undertakings from private companies, under the Compulsory Purchase Acts, the price has been determined (by arbitration) upon the basis of earning capacity, with appropriate adjustment for expenditure *versus* earnings in the near future. If extraordinary maintenance expenditure, or further capital expenditure, is necessary to maintain the current rate of earnings, an equivalent sum is deducted from the price fixed by the earning capacity. If, on the other hand, future growth in earnings has been already paid for by judicious capital expenditure in the past, an equivalent sum is added to the price fixed by earnings. Thus, structural capacity and efficiency are properly recognized as the essential factors in establishing the value of a gas undertaking, but not as the controlling factor, which is always the actual earning capacity. Moreover, Parliament allows the shareholders as much as 10 per cent. additional as compensation for compulsory disturbance of investment, as well as annuities to directors and officials as compensation for loss of occupation.

That it pays to be honest is demonstrated by the fact that, at the outbreak of the war, Great Britain had the cheapest gas service in the world.

A Confiscatory Policy.

In America, on the other hand, a distinctive confiscatory attitude is assumed by most of the Commissions. The value of a business is its sustained earning capacity; and no business is of any value whatsoever unless it has present or prospective earning capacity. But, in fixing gas rates, State Commissions ignore earning capacity altogether. In the view of many Commissions, the value of a seasoned public service enterprise, in profitable operation and in the highest practicable state of efficiency and repair, is merely the present cost of physical reproduction. Furthermore, under the guise of "depreciation," they usually deduct one-third from their estimate of the cost of physical reproduction, because the property is second-hand. Then they fix a selling price for gas which allows the gas company to earn (if they can) 6 per cent. upon their estimated cost of reproduction, less this depreciation.

The constitution of the United States prohibits the confiscation of private property; and the Supreme Court has decided that compulsory gas rates that will not earn 6 per cent. upon the actual value of a gas undertaking are confiscation. But constitutional defence of the right to possess private property, by decreeing that a return of less than 6 per cent. is confiscation of a gas owner's property, is vastly different from suggesting that to earn above 6 per cent. is confiscation of the gas consumer's money. Nevertheless, some Commissions act as if the constitution, in prohibiting a lower rate of return than 6 per cent. as confiscatory, also forbids a higher rate than 6 per cent. as unjust and unreasonable; and, at great labour and expense, they fix gas rates that will earn the minimum constitutional return upon the reduced value of gas undertakings, estimated as above described. Just and reasonable rate regulation, in their view, means reducing the rates exactly to the point of confiscation.

This procedure is unjust to both gas owner and gas consumer, whose interests, broadly speaking, are identical. If it continues, the loss to the gas consumer will be far more in the aggregate than the loss to the gas owner. For example, this method treats all structures as alike, since all alike have reproduction value. Whether installed wisely or foolishly, whether technical failures or unique examples of advanced efficiency, whether obsolescent, inadequate, or redundant—all construction is grist alike for their mill, provided the physical condition be the same. With this method in vogue, no gas company can afford to scrap inefficient buildings and plant, for these have reproduction values perhaps as great as the new building and plant that would take their place. So the consumer must continue to pay the price of inefficiency, inasmuch as any money the gas company might invest in reducing the cost of gas in such circumstances would be wholly confiscated. The resulting paralysis of technical and financial effort and initiative will inevitably bring the gas business into a condition of decadence, and consumers will bear the brunt of the loss.

Gas manufacture is a rapidly changing art. It is possible to find gas-works whose cost of structural reproduction per unit of output is double that of gas-works where the cost of manufacture is less. The former may be the result of successive additions on conservative lines; whereas the latter would be the product of advanced technical genius, supported by a far-sighted policy of scrapping existing plant whenever the net efficiency could be increased. The capital expenditure in the latter case might easily be the greater of the two. Yet, after adequate annual payment upon this capital and for amortization of the scrapped plant, the consumer profits by a cheaper supply of gas. Manifestly, the interests of the consumer have been better served in the latter case; but, with gas rates based solely upon the cost of structural reproduction, the company whose enlightened administration has benefited, not only its own, but all other gas consumers, is penalized for its progressiveness by the confiscation of one-third of its earnings. Who, then, will go and do likewise?

Suppose we accept the present cost of structural reproduction as the only value of gas processes, plants, and businesses which have been laboriously developed through a century of persistent effort. Further deduction of (say) one-third for "depreciation"—because the undertaking is not a new enterprise, but, on the contrary, has thoroughly demonstrated its permanent value as a going concern—is strangely indefensible. A brand new and finished gas undertaking, with its works, holders, distributing system, meters, and stoves, is a practical impossibility; and who, in his senses, would invest one dollar in any new enterprise where the maximum return is limited to 6 per cent., and one-third of his investment is confiscated by the time it attains its full value as a going concern.

Gas is a service which must, of necessity, develop with the growth of the municipality. Some of the plant must be new and some of it old, just as some parts of the city are new and some old. All that interests the gas consumer is that the whole plant be efficiently maintained in a condition to render him proper service at a reasonable rate. In this respect, a tried and seasoned gas undertaking, with all of the inevitable faults of new design and construction finally perfected, and with all of its employees and administrators highly trained and organized, is far better than a brand new undertaking.

Labour and Co-Partnership.

In the concluding portion of his address, Mr. Glasgow dealt in a forcible manner with the labour problem. There is, he said, in the course of his remarks on this subject, no basic reason for antagonism between capital and labour, between employer and employed. On the contrary, it is obvious that their interests are identical, since each is essential to the other for the accomplishment of the ends jointly desired. It is, therefore, our plain duty to cure the present artifical differences; and there are remedial methods neither experimental nor difficult. Since co-operation is essential between employer and employed, co-partnership is the simple and direct solution. Co-partnership in profit-sharing, supplemented where practicable by co-ownership, through the investment of the employee's share of the profits (over and above his regular wages) in the business for which he works.

It is fitting that I should advance this principle upon the present occasion, because modern co-partnership of this nature was originated in the South Metropolitan Gas-Works by the late Sir George Livesey in the eighties of the past century, after he had won the most crucial strike that ever occurred in the gas industry. Co-partnership has since been adopted by that other commanding personality, the late Sir Corbet Woodall (the Governor of the London Gas Light and Coke Company), and by many others. In the gas industry, this principle has established practical identity of interest between the individual employer and his own workmen. Why not in other industries?

Export of Goods containing Aniline Colour.—The Director of the War Trade Department announces that it has recently been decided that manufactured articles containing aniline colour may, so far as the prohibition on the export of coal-tar products is concerned, be exported without licence, provided the goods do not contain more than 3 per cent. of aniline colour.

Midland Association of Gas Engineers and Managers.—Members are invited by the Directors of the British Gaslight Company, Limited, to visit their works at Etruria, Stoke-on-Trent, on Thursday of this week, to inspect the benzol and toluol plant recently iustalled. The members will also be able to view the works. After lunch, on the invitation of the Directors of the Company, Mr. H. E. Copp is arranging for a visit to Messrs. Wedgwood and Sons' pottery works, or, for those who prefer it, the Broad Street show-rooms of the Gas Company will be open for inspection.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Will o' the Wisp of Uncarburetted Hydrogen.

SIR,—As a substitute for the German ideal of Government put forward by Mr. Glover, I would suggest a British one for which there is already a precedent. Twenty million tons of coal are consumed in London, one-fifth of which is carbonized by the gas undertakings. If the products of coal distillation are urgently needed, why cannot the use of raw fuel be prohibited, as it was in (I think) King Charles's time? Surely this is the more attractive proposition.

CHARLES CARPENTER.

709, *Old Kent Road, S.E., July* 15, 1916.

The Testing of Gas-Heated Cookers.

SIR,—With reference to the article in your issue of the 11th inst., dealing with the above subject, and in which the results of tests of certain ovens are set forth, it seems right it should be known that the writer of that article, Mr. Stanley C. Farrar, left our laboratories some six weeks ago for another post. He gained his main experience of gas-apparatus testing at our works, and as one of our confidential chemists; and the tests which he discloses are tests made by him with our apparatus in our laboratories, while one of our assistants, and under the directions and on the instructions of our Chief Chemist.

We have been for a considerable time conducting an investigation for arriving at a standard method of gas-cooker test; and in the course of that investigation Mr. Farrar has from time to time, by our directions, carried out various experiments for us.

As it has been in the course of his training with us that Mr. Farrar acquired the information upon which he bases his article, we think it should be stated that the article has been communicated without our permission for the use of the material obtained from us. It would obviously be most unfortunate if members of a manufacturer's technical staff were at liberty, on quitting their employment, to publish to the detriment of their late employers, and without such employers' permission, confidential matter acquired while acting in a confidential capacity.

JOHN WRIGHT AND CO.

Essex Works, Birmingham, July 14, 1916.

Life of Gas-Meters Joint Research Committee.

SIR,—I am instructed by the Joint Committee to forward you the paragraph below, for insertion in your next issue.

WALTER T. DUNN, Secretary,
Institution of Gas Engineers.

39, *Victoria Street, S.W., July* 10, 1916.

> We are informed by the Joint Committee on the "Life of Gas-Meters Research" that Dr. Lessing has not resigned his position as Chemist to that Committee.

REGISTER OF PATENTS.

Manufacture of Gas.

EADY, L. H., and CLARKE, H. W., of Southampton.

No. 8830; June 15, 1915.

According to this invention, gas is continuously drawn from some point between the retort and the exhauster and passed to testing apparatus, "whereby there is obtained, at very little cost, an indication of the quality of the gas practically as soon as it is made . . . which enables a more satisfactory service to be maintained and the average production per ton of coal carbonized to be increased." The arrangement also serves as a "tell-tale" for temporary troubles—such as unsealed dip-pipes, stoppage of the exhauster, choked retort-house governor, and the like.

A diagrammatic sectional elevation and a plan of the apparatus proposed shows a water-jet pump for drawing gas from between the retorts and the exhauster, a jet photometer receiving the gas, and a water-loaded retort-house governor "with readily accessible means for varying the load, so as to minimize the variations or restore the make to the desired quality in accordance with the indications of the photometer."

The water-jet pump A consists of a casing formed with a water inlet B, a gas inlet C, a gas and water outlet D, and conical seats at E and F, and a removable member having a conical head formed with faces that make tight joints with the seats. A nozzle leads from the water-inlet B to the gas inlet space between the seats and terminating just above a mixing-tube G, which delivers the gas and water to the space in the casing below the seat F that communicates with the outlet D. The removable member is held firmly in position by a screw stud H passing through the bottom cover I. The gas and water are delivered into a trap-box K provided with a gas outlet pipe L, a tubular division plate M formed with apertures at the bottom and open at the top to the atmosphere, and a water overflow pipe N from the interior. The gas inlet pipe C is carried through the water-trap, preferably within the tubular division plate M, and is enlarged so as to give a greater surface in contact with the water and to cool the gas. The gas outlet pipe L leads to the bottom of a purifier and filter O, preferably provided with a removable grid at the bottom supporting the filtering material. A pipe P lead the gas thence through a governor Q to the jet photometer R; in proximity to which are situated cocks S and T by which the load on the retort-house governor bell U can be varied. To enable this to be done, the governor bell is formed with a tank into which dips the short limb of the syphon V formed with two branches—one connected through the cock S with a water supply and the other leading through the cock T to waste.

Assuming both cocks to be closed, by opening the cock S the water load on the bell U will be increased, or the water load can be decreased by opening the cock T. The cocks are opened and closed so as to maintain the photometer flame of as nearly constant length as practicable.

With such an arrangement, the patentees claim that the production of gas can be maintained at practically constant quality. The water consumption is very small, and may be ultimately used for other purposes; while the arrangement requires very little attention to keep satisfactorily working—the parts liable to require cleaning being constructed so as to be capable of being easily taken apart or rendered accessible to cleaning implements.

Revoluble Retorts.

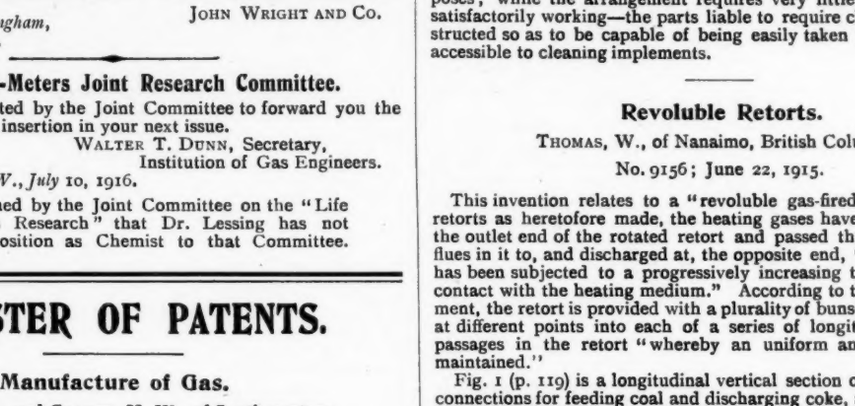
THOMAS, W., of Nanaimo, British Columbia.

No. 9156; June 22, 1915.

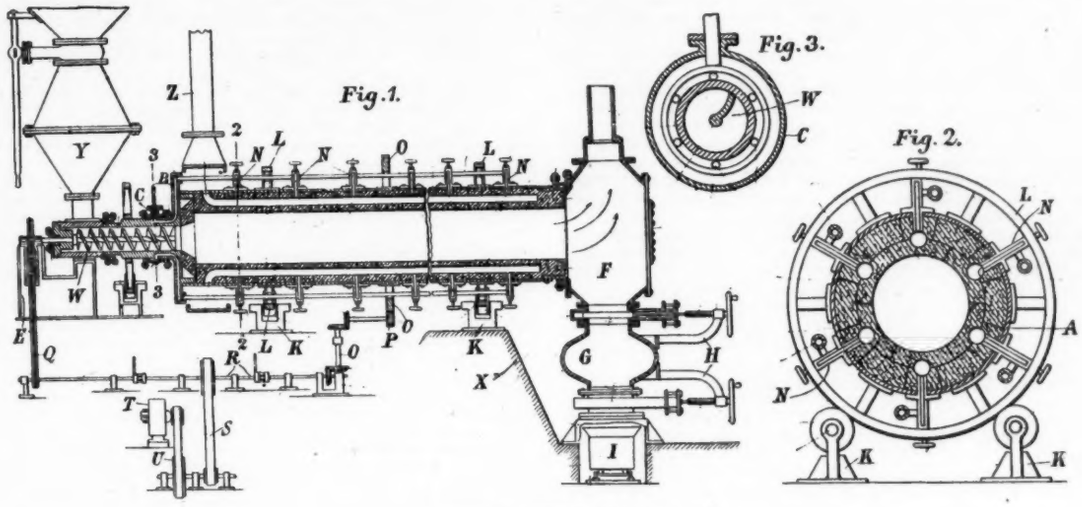
This invention relates to a "revoluble gas-fired retort." In such retorts as heretofore made, the heating gases have been admitted at the outlet end of the rotated retort and passed through longitudinal flues in it to, and discharged at, the opposite end, "whereby the coal has been subjected to a progressively increasing temperature out of contact with the heating medium." According to the present arrangement, the retort is provided with a plurality of bunsen burners opening at different points into each of a series of longitudinal combustion passages in the retort "whereby an uniform and even heating is maintained."

Fig. 1 (p. 119) is a longitudinal vertical section of the retort and its connections for feeding coal and discharging coke, and operating gearing in elevation. Fig. 2 represents a transverse section on the line 2—2 of fig. 1, looking to the right. Fig. 3 represents a similar section on the line 3—3, looking to the left-hand end of the retort.

The retort A is of sheet iron with a fire-brick lining, having longitudinal ducts or passages provided at one end with gas outlet ports. The shell and lining are provided with longitudinal lines of openings for the bunsen burners N arranged to discharge into ducts or passages. At the discharge end of the retort there is riveted to the shell a turned iron annular casting, which protects the fire-brick lining and forms part of a stuffing-box in which the end of the retort turns. The other



Eady and Clarke's Gas Production "Tell-Tale."



Thomas's Revoluble Retort.

part of the stuffing-box is secured to the wall of the stationary discharge head or chamber F. At the inlet or feed end, the retort is closed by a head B, having a central extended neck (for feeding coal) connected to a stationary feeding duct by a stuffing-box in which it turns. The head is also provided with a series of radial gas inlet ducts which also extend along the neck to an annular inlet groove in the fixed collar C provided at each end with a stuffing-box. The outer end of the coal-duct is closed by a stuffing-box, through which is passed the shaft of the screw-conveyor W. A stand E supports the coal-duct and magazine Y and part of the operating gearing for the conveyor.

The discharge head or chamber F and the coke-chamber G are supported on an angular base-piece over a conduit for a coke-car I. To the top of the chamber F is secured a gas take-off pipe connected with a hydraulic main or seal-box (not shown). The chamber has bolted to it a removable cover-plate; and to the lower end of the chamber is secured a valve casing, in which works a sliding gate valve having a screw-threaded stem working through a threaded opening in a supporting frame H. The coke-chamber G is secured to the casing, and has attached to its lower end a valve casing containing a gate valve provided with a screw-threaded stem working through a threaded opening—the valve stems being provided with hand wheels. The chamber G, with its upper and lower valves, provides an air and gas tight discharge for hot coke from the chamber F and the retort.

The retort is supported by bearing wheels on rollers. Pillars K (having bearings) carry rollers which rest by their journals in the bearings, and the pillars are fixed on concrete foundations X. The bearing wheels L are secured by their annular flanges to the shell of the retort and rest on the rollers. Similar pillars, carrying rollers and a wheel, support the feeding neck.

Bunsen burners N, having regulating valves, are secured to the shell at the openings for discharging numerous flames into the ducts, and so maintain "a uniform and moderate temperature throughout the length and circumference of the retort, and so as not to cause cracking and breaking of the fire-brick lining by excessive heat at any one point." The gas will be supplied under pressure and take in air in a well-known manner at the bunsen burners. The gas outlet ports open into a stack Z, which at its lower end encircles the retort.

A spur wheel O engages with a toothed wheel P (fig. 1) meshing with a bevelled pinion so as to drive the shaft R. A clutch is connected in the shaft. A motor T has on its shaft a small belt wheel which connects with a large wheel U on a shaft carrying a second and smaller belt wheel. A belt S is passed over wheels for turning the power shaft R. The shaft of the conveyor W passes out through a stuffing-box and turns in a bearing on the frame E. To the shaft is secured a large sprocket wheel, over which is passed a sprocket chain Q, engaging also with a wheel on the shaft R.

Alluding to this arrangement, the patentee says: My revoluble retort will, in practice, be made about 100 feet long, in order to give the coal a sufficiently long exposure to the heat at a moderate temperature of about 900° Fahr. The operation is very simple. The coal may be fed from the magazine continuously during the carbonizing operation, or at suitable intervals, according to the progress of distillation and evolution of gas in the retort. The bunsen burners, after being lighted, will be regulated to secure the desired temperature in the retort. The coke delivered into a chamber F will, at intervals, be discharged into the chamber G, and after it has sufficiently cooled it will be discharged into the car I. The feeding of coal may be stopped by shifting the clutch to disconnect the power shaft R.

Industrial Gas Burners and Furnaces.—No. 100,603.

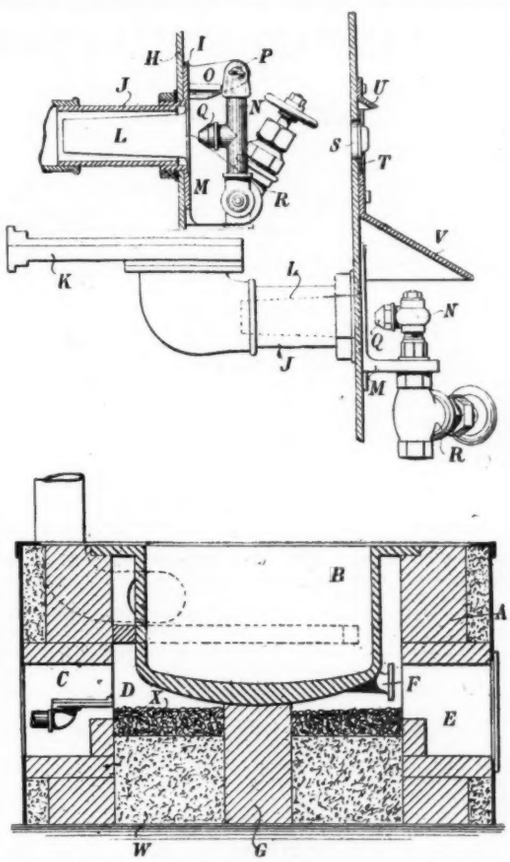
South Metropolitan Gas Company and Chandler, D., of Old Kent Road.

No. 685; Jan. 15, 1916.

This invention, in reference to gas-heated furnaces, is directed to an "arrangement of parts which will promote efficiency and facilitate maintenance." There is usually, the patentees point out, much dust and dirt in the neighbourhood of gas-furnaces, and there is a great tendency for deposits to be formed on or in the burners, necessitating their dismounting and cleaning at short intervals. It is important, therefore, that the burners should be so arranged, and the furnace so constructed, that the labour necessary for effecting frequent cleaning be reduced to a minimum.

A furnace burner is shown arranged in accordance with the invention and a furnace in connection with which the burner is employed.

The furnace comprises a circular setting A, of refractory material (lagged with some non-conductor), with a crucible B for the substance to be melted placed centrally therein. The burners are arranged in chambers C in the wall of the setting communicating with the internal



Chandler's (South Metropolitan Gas Company) Industrial Burners and Furnaces.

space D around the crucible. Another chamber E gives access to the runner F, through which the crucible is emptied, G is a central support for the crucible. So far the arrangement is much as usual.

In order to facilitate the cleaning of the burners, the latter are mounted in the following manner: H are plates bolted to the wall of the furnace outside the chamber C. In these plates are inserted annular plates I, to which are secured the barrels J, which carry the burner heads K. The injector tube for each of the burners is formed by a detachable hollow cone L introduced into the barrel from the outer end. The cone being detachable, it can be removed and replaced by another of different dimensions, if required, for purposes of

adjustment and regulation of the combustible mixture. On the outside of each plate I is a lug M, to which is jointed the gas supply pipe N, which carries the nipple Q, and likewise on the plate I is another lug O, to which the closed end of the swivelling gas supply pipe N may be secured by a cottar pin P. The pipe N is capable of assuming two positions—one in which the nipple Q, projecting latterally from the pipe, is brought into alignment with the middle of the injector tube L, and the other in which the pipe is turned back from in front of the tube L. The cock R, for controlling the gas supply to the nipple Q, remains stationary when the pipe N is moved. S is a lighting hole in the plate H covered by a sliding shutter T and shielded by a small hood U. V is a hood for shielding the burner, and preventing the deposit of dust from settling on the outer portions.

Within the furnace, just below the level of the burner flames and supported on a layer of sand W, is a layer of refractory material X (sometimes called fuel), which becomes incandescent and, in consequence, adds to the heating efficiency of the burners.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 12.]

Nos. 9266–9667.

ALEXANDER, W.—"Piston packing for diaphragms of gas-meters." No. 9304.
CLOUD, J. W.—"Compressors." No. 9457.
DARIER, G. E.—"Recovery of benzene hydrocarbons from coal gas." No. 9597.
DAVIS, H. N.—"Furnaces." Nos. 9543-4-5.
DICKIE, W.—"High-pressure taps and cocks." No. 9450.
DOLENSKY, E.—"Gas-producer plants." No. 9358.
FISHER, H.—"Handling coal." No. 9394.
HENDERSON, P. S.—See Dickie. No. 9450.
INGLEBY, J. C. B.—"Producing power by compression of gases." No. 9375.
LOCKLEY, A. E.—"Pipe-joints." No. 9524.
PINCHBECK LIMITED.—See Alexander. No. 9304.
TWIGG, W. R.—See Davis. Nos. 9543-4-5.
WESTAWAY, J. C.—"Gas-burners." No. 9396.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:

Bills reported, with amendments: Conway and Colwyn Bay Joint Water Supply Board, Tynemouth Corporation Water.
Bill returned from the Commons, with the amendments agreed to: Wakefield Water.
Bill read the third time and passed: Local Government (Ireland) Provisional Order (Gas).

Calorific Power Bill.

This Bill was brought from the Commons and read the first time and second time on Tuesday and Wednesday respectively. A Committee of the whole House considered the Bill on Thursday; the following amendment by Viscount Churchill being added to clause 1: After the word "proper" insert "including such variation as they may think desirable of the prescribed pressure at which the gas is to be supplied." The Bill, with the amendment, is to be reported in the House to-day.

HOUSE OF COMMONS.

The following further progress has been made with Bills:

Bills reported, with amendments: Colchester Gas [Lords], Ferndale Gas [Lords].
Bill, as amended, considered, and to be read the third time: Hornsey Gas.
Bill, as amended; to be considered to-morrow (Wednesday): Aberdare and Aberaman Gas.

The Lords amendments to the Wakefield Corporation Bill were considered last Tuesday, and agreed to.

The West Riding of York Asylums Board deposited a petition against alterations in the Yeadon Water Bill [Lords].

The petition deposited by Messrs. Brotherton and Co., Limited, against the Newcastle and Gateshead Gas Bill [Lords] has now been withdrawn.

COLCHESTER GAS BILL.

The Unopposed Bills Committee of the House of Commons last Thursday sent this Bill forward for third reading. It has already passed the House of Lords [see "JOURNAL," May 23, p. 398].

Mr. SIDGWICK (Messrs. Rees and Frere, Parliamentary Agents) explained the circumstances of the Bill as they were fought out in the other House, and said there was one matter which he ought to bring before the Committee perhaps in more detail. At the present time the Company—a maximum dividend company—had the large carry-forward of £11,000. The amount sufficient to pay one year's dividend was £4000, leaving £7000 which was more than the Company would have the right to carry forward when the sliding-scale came into operation. Therefore it was asked that the Company might pay the costs of the Bill out of revenue. This had been granted in a number of cases. Then they asked for leave to transfer the carry-forward to the special purposes fund—a policy which the Board of Trade had sanctioned in an Order granted last year.

The CHAIRMAN asked if this would be to start the special purposes fund.

Mr. SIDGWICK said that this was so. Yet another proposal of the Bill was that the provisions under the sliding-scale, that not more than one year's dividend can be carried forward from year to year, should not come into operation until the end of the year 1917, instead of the end of 1916, as would be the case in the ordinary way. In other words, he was asking to be allowed to spread the surplus revenue over a year-and-a-half instead of having to get rid of it by selling gas at an abnormally low price in order to exhaust it at the end of the present year. The Company would not be able to divide any more money among the shareholders, because on the 1st of January next the divisible profits would depend upon the price at which gas was being sold according to the sliding-scale.

Continuing, Mr. SIDGWICK said there were two small points with regard to the profit-sharing clauses to which he wished to call attention. He asked for a clause which had been granted very often—namely, one giving the right to issue stock direct at market price to the persons or trustees entitled to it, without having to put it up to auction. The other point was in regard to the provisions enabling stock held by co-partners to be dealt with by nomination. At present there was an elaborate set of rules and regulations, but provision had been inserted enabling the Company by a simple order to vary these regulations if they were found to be not quite workable in all respects. It had been very difficult to frame regulations which would meet all the different circumstances; and he himself had found that every time he came to redraft them, he was asked to make some amendment. It was in order to save the Company having to come to Parliament again that he had put in this provision, which the Board of Trade had allowed in the Liverpool Gas Order last year. Another proviso in the Bill was that if on Dec. 31 next the reserve fund exceeded £5000 they should transfer the excess back to the profit and loss account. The point of this proposal was that the share capital at the present time was £50,000 in addition to the loan capital. The Company had built up a reserve fund equal to one-tenth of the share and loan capital together—believing that they were legally entitled to do so. But it was held in some quarters that the strict interpretation of the Gas-Works Clauses Act was that a company could only have one-tenth of the share capital; and therefore the Company had agreed to pay the excess back into the profit and loss account. This had been agreed at the request of the Local Authority.

FERNDALE GAS BILL.

This Bill was before the Unopposed Bills Committee of the House of Commons last Thursday, and was ordered to be reported for third reading. It has already passed the House of Lords as an unopposed measure.

Mr. LEES (Messrs. Lees and Co., Parliamentary Agents) said the Bill was promoted by the Ferndale Gas Company, who obtained their first Provisional Order in 1883; the authorized limits of supply being the northern portion of the Rhondda Park Valley in the Rhondda urban district. The original share capital was £20,000, with £5000 borrowing powers; but in 1914 the Company had exhausted their capital powers, and undoubtedly ought to have come to Parliament then. Instead, however, they went to their bankers; and although they were prohibited from raising more than £5000 on mortgage, they obtained an overdraft of £5000 secured by the Directors' guarantee. Further sums were also borrowed from private individuals; so that altogether they borrowed on capital account sums amounting to £11,400. He did not think it could be suggested that anybody had been hurt by this procedure—especially as the Company had paid quite reasonable rates of interest ($4\frac{1}{2}$ and $5\frac{1}{2}$ per cent.) until the last few loans. In addition, at the end of 1914 the Company found themselves in trouble with their principal gasholder, owing to subsidence in the district, which, of course, was entirely a mining one. The engineers advised that it was not possible to repair the holder and maintain the supply of gas at the same time; so it was necessary, in order to keep the supply going, to enter into a contract for a new holder, which was to be erected at a cost of £8000. The new holder should have been completed last month, and would have been but that bad weather had prevented the excavations being carried out to time. Thus it was necessary to come to Parliament now for additional capital to meet these liabilities of £11,400 and £8000. At the same time the financial position of the Company was not good because difficulties from subsidence had been a very serious item in maintenance; while the site was also very restricted—the result being that last year the Company were unable to pay any dividend on their ordinary shares. In addition, a valuation of the undertaking had been made by Mr. Henry Woodall, who found that sums amounting to £3800, which had been put into the undertaking, were not now represented by assets. Therefore it was proposed to form a capital redemption fund entirely out of profits, in order to wipe out the amount in question. The expenditure had been brought about by the fact that a new system of retorts had been installed, but the cost had not been written-off, and it was proposed to write it off in the way he had suggested. The Bill had been very carefully considered by the Rhonda Urban District Council; and they had met the Company fairly and recognized the position they were in. The Council did not petition against the Bill in either House, but required certain alterations made, which had been done—one of the conditions being that a certain amount each year must be placed to the capital redemption fund to which he had referred, before the ordinary shareholders obtained any dividend. It was consequently proposed to place £200 per annum to the fund. Another condition was that the rather high standard price given in 1883—namely, 6s. 10d. per 1000 cubic feet—was to be reduced to 5s. The Council were satisfied with these conditions.

The CHAIRMAN asked how if the Company were not going to make any profit on the ordinary shares, new capital was to be raised.

Mr. LEES said it would be raised as preference capital, because the

Company at present had no capital of this sort. The position had been placed before the Treasury, having regard to the fact that the cost of the holder had to be met immediately; and the Treasury had been asked whether in these circumstances they would exclude from the restriction clause as to capital being raised during the war, the necessary sums to discharge the liabilities which he had detailed to the Committee. The Treasury, however, had replied that they could make no exception to the clause. Then the Company asked the Treasury if, assuming they could get their creditors to take preference shares or debentures, they would have any objection to paper being given when there was no public issue. Again the reply came that it was the practice not even to allow such an arrangement without special consent, and therefore provision had been made in the Bill for the issue of preference stock at par to any of the creditors who would accept it. The Treasury clause would still apply, although he did not think there would be so much difficulty in getting sanction to issue such stock as there would be if capital was raised in the market.

The CHAIRMAN asked if it were usual in the Treasury clause to exempt the payment of the costs of the Act.

Mr. LEES said this was done in all the Acts passed last session.

YEADON WATER BILL.

A Committee of the House of Commons, presided over by Sir WILLIAM MIDDLEBROOK, commenced the consideration of this Bill on Wednesday last. It has passed the House of Lords [see "JOURNAL," May 23, p. 401]; but whereas then there were four petitioners against it, there was now only one. There was, however, a petition against alterations.

Mr. HONORATUS LLOYD, K.C., and Mr. TYLDESLEY JONES appeared on behalf of the promoters. Mr. W. B. CLODE and Mr. W. J. JEEVES represented the Wharfedale Rural District Council; while the West Riding of York Asylums Board, who appeared against alterations, were represented by Mr. FREEMAN, K.C.

Mr. HONORATUS LLOYD explained the details of the Bill, which is promoted by the Yeadon Water Company, and is the same now as when it was before the House of Lords Committee. Briefly, the Company are in urgent need of additional water; and by the Bill they hope to secure a further 580,000 gallons per annum. To do so it is proposed to acquire a new gathering ground of 120 acres, to obtain confirmation of the use of a well already sunk, and to construct additional works. Additional capital to the extent of £15,418 is also asked for. The opposition of the Wharfedale District Council claimed that the new gathering ground upon which the well mentioned is sunk would interfere with the supply of water now given by them. The case rests largely on geological evidence which before the House of Lords Committee was given at considerable length. A large number of geological witnesses have again been retained. The position resolved itself, said Mr. Lloyd, into two theories. The Yeadon Water Company's argument was that the Wharfedale supply is quite safe from any operations of their well, inasmuch as the latter having had to be driven down to 700 feet, and the pump working at 400 feet draws from a large subterranean supply of water absolutely independent of that drawn upon by the Wharfedale Council a short distance away. On the other hand, the Wharfedale argument is that the springs from which they obtain their supply flow from the same source as that tapped by the Yeadon well. If this latter theory was right, then it was clear that the water in the Yeadon well would be overflowing the top, as it was at a considerably lower level than the Wharfedale springs. But the fact was that they could only get water at a depth of 400 feet below the surface. The Asylum has made an arrangement with the Company in regard to a well in the Asylum grounds.

The Committee eventually adjourned until to-day (Tuesday).

LEGAL INTELLIGENCE.

A SOUTHAMPTON COMPENSATION APPEAL.

The MASTER OF THE ROLLS and Lords Justices PICKFORD and WARRINGTON last week heard an appeal by the defendant in the case of *Southampton Gaslight and Coke Company v. Stride* from the award of his Honour Judge Gye at the Southampton County Court in favour of the Company for 1d. per week.

The appellant, a blacksmith's striker, who had been in the employment of the Gas Company for about twenty years, on June 7, 1912, was with the assistance of another man lifting a bar of iron from a rack, when the bar, which weighed about ¾ cwt., got jammed, and both men had to exert considerable force to move it, when it suddenly released itself and threw appellant, causing an injury to his back and leg. The Company admitted liability, and paid compensation at the rate of 13s. per week till July 16, 1914, and 10s. as a gratuity until the hearing of the arbitration on Jan. 5, 1915, when the Judge ordered them to continue to pay this sum until total or partial incapacity ended. At the hearing of the arbitration, the Judge, notwithstanding incapacity was proved, said he should not grant more than the 10s., so as to give a "shock" which the doctor had stated might effect a cure. About eight months later, the Company filed a request for a review, on the ground that the man was able to resume work; and on Jan. 11 last, the Judge decided in favour of the Company, and terminated the compensation, notwithstanding the fact that "diminution" had only been applied for.

Mr. RIGBY SWIFT, K.C. (with him Mr. G. C. KINGSBURY), for appellant, contended that there was no evidence which justified the learned Judge in reducing the amount of compensation from 10s. to 1d. per week, and that he had not appreciated the real facts of the case. Appellant had been treated by Dr. Buzzard (the Company's doctor) for paralysis of the lower limbs; but still he could not walk. It was said that the will-power was so affected that he thought he could not walk, and it was considered that a "shock" would act as an incentive to cure this defect. The application of the Company to reduce the amount of compensation was based on the ground that the workman was able to resume work, and that his inability to do so was not due to the accident but to neglect of physical and mental effort as directed by the Court. The amount was then reduced to 10s., and leave was given to apply to terminate or reduce this amount. He submitted there was no evidence on which the learned Judge could come to the conclusion that the compensation ought to be diminished, and, further, there was no change in the circumstances which was favourable to the employers from the award of January, 1915, up to the hearing of the arbitration in 1916; and as the incentive which was tried had failed to work, the original amount of compensation ought to be resumed.

Mr. HOLMAN GREGORY, K.C. (with him Mr. S. H. EMANUEL), for the respondents, submitted that the Judge had arrived at a correct conclusion, upon the evidence of the medical experts, that the will-power had to be built up, when the full use of all the limbs would be regained. The Company had no wish to act unfairly. They had offered to find light work for the man to do, but he had declined the offer. The learned Judge found that the incapacity was not the result of the accident, but of the man's conduct in not taking steps to cure himself. There was a deficiency of will-power which would not exist if the man carried out the doctor's instructions. His condition in 1916 was not the result of the accident, but was due to failure to do that which a reasonable person would do to effect a cure. The man (who was only 37 years of age) had no organic disease, but was merely suffering from want of will-power.

Their LORDSHIPS, at the conclusion of the arguments, said they would take time to consider their judgment.

ASSESSMENT FOR WATER-RATE.

A Scottish Special Case.

On the 5th inst., judgment was given in the First Division of the Court of Session—by the Lord President, and Lords Johnston, Mackenzie, and Skerrington—in a special case involving the Caledonian Railway Company and the North British Railway Company (first parties) and the County Council of Lanark (second parties), which raised questions as to the assessment for water-rate of the Railway Companies by the County Council.

The Lanarkshire (Middle Ward District) Water Order, 1913, amended certain provisions of the County Council's Water Acts with regard to the assessment of the domestic water-rate; and the County Council for the year to Whit Sunday, 1914, levied and imposed on the Railway Companies the domestic rate upon one-fourth of the value of their respective undertakings other than stations, depôts, and similar buildings. In regard to the stations, &c., as they either received a supply for non-domestic purposes, or were within 100 yards of some of the Council's pipes, the Council exercised an option which they believed they possessed under section 44 (6) of their Order. Where water was supplied and the charge by meter exceeded the amount which could have been recovered by imposing the domestic rate, an account was rendered for the water consumed. Where, however, the amount of the domestic rate would have exceeded the charge by meter the domestic rate was exacted. The first year the Railway Companies did not appeal against the assessments; but when the same procedure was followed the next year, they challenged the competency of the method of assessment adopted. The appeal was, however, dismissed. The Railway Companies now contended that, upon a true construction of section 44 of the Order, the Council must treat the whole undertaking belonging to each of them within the Middle Ward Water District as one heritage, the property of one owner, and must make their election between levying the domestic rate on the whole undertaking so far as liable to that rate, or exacting charges for water supplied for non-domestic purposes by meter at various places on the undertaking within the district; but that in no case could the Council assess part of the undertaking to the domestic rate, and at the same time charge for water supplied for non-domestic purposes to other parts. The Council maintained that under section 44 they were entitled to regard the railway lines and each station, depôt, &c., as a separate and distinct subject; and that accordingly where water was supplied for non-domestic purposes to any station, depôt, &c., they were entitled to elect as regarded that particular subject between the domestic rate and the charge for the water supplied—the only limitation on their right being that they could not charge any individual station, depôt, &c., with both the domestic rate and an account for water supplied. The rate levied on the Caledonian Railway Company on the basis of domestic assessment and meter charges as imposed for 1914-15 was £2020, and on the North British Railway Company £470. The amounts which would have been payable on the basis of assessment for the whole undertaking of each of the Companies was £1297 and £310 respectively; while the amounts which would have been payable on the basis of meter charges only were £881 and £185 respectively.

The Division upheld the procedure of the County Council, and answered the questions accordingly.

Irish Gas Manager's Dismissal.

The King's Bench Division, Dublin, have remitted for trial in the County Court of Meath an action by Mr. Thommas Connell, against the Trim Urban District Council, for alleged wrongful dismissal from the position of Gas Manager, which he had held for years at a salary of 25s. per week. It was stated by Counsel for the defendants that the gas-works had been losing money, that Mr. Connell had the option of resigning, but declined to avail himself of it, and that the resolution of dismissal was then passed. The motion was opposed on the ground that the circumstances of the dismissal were such as to preclude plaintiff getting a similar position.

MISCELLANEOUS NEWS.

SUPPLY OF TOLUOL FOR EXPLOSIVES.

The Widnes Town Council and the Ministry of Munitions.

Despite a communication from the Ministry of Munitions reminding the Widnes Town Council of certain compulsory powers they possessed, by ten votes to eight the members last week refused to sanction the erection of plant for the extraction of a larger percentage of toluol from the town's gas for the manufacture of high explosives.

The proposal was first brought before the Council a month ago by the Gas Committee, and was defeated by a considerable majority. In the meantime, a letter was received from the Ministry of Munitions urging upon the attention of the Council the fact "that the French, whose coke-oven district is in the hands of the enemy, look to this country for their main supplies of benzol, which forms the basis of the bulk of their explosives." The letter proceeded:

> "Although the co-operation that has been extended to this department by the gas industry as a whole has rendered the application of compulsory measures unnecessary, your Council will appreciate that the existence of the slightest prospect that the French requirements—quite apart from this country—might not be able to be met would require any action being taken which might be considered necessary to remove apprehension in this respect. I am directed, therefore, to express the hope that your Council will reconsider their decision at the earliest possible opportunity—particularly as an output of toluol and benzol of no little value might be anticipated from a works of the size of Widnes."

The Gas Committee thereupon re-affirmed their resolution of June 6, that the Engineer (Mr. Isaac Carr) be instructed to obtain tenders for the erection of a toluol and benzol plant, and that the Finance Committee be requested to make application to the Local Government Board for sanction to the borrowing of £1500, the sum estimated to be required to provide the necessary plant. On the minutes of the Committee containing the letter from the Ministry of Munitions and this resolution being presented,

Alderman H. S. TIMMIS, J.P. (the Chairman of the Gas Committee), said he was not present at the last meeting of the Council, when the scheme was opposed; but he gathered from the report in the Press that a misapprehension existed at the meeting. The process which had hitherto been used for the production of toluol for war purposes had the disadvantage of also producing naphthalene; but in the course of the past year a new process was evolved, and a representative of the Ministry toured the country interviewing gas authorities on this point. He visited Widnes a short time before the last Town Council meeting; and the result was that a scheme for the installation of a new plant was put forward by the Gas Committee. Mention was made in the letter from the Ministry of Munitions of the amount of toluol which could be expected from a gas-works of the size of Widnes. The consumption of gas at present was by no means normal; but they had in Widnes a works which was more fitting for a town of 100,000 population than 30,000. In fact, few towns of 100,000 had so large a works as Widnes had. If every gas-works of the size had adopted the view taken by the Council at the last meeting, they could imagine what a serious position the men at the front would be in. The new scheme would not diminish the lighting power of the gas to an extent which would jeopardize local works. Other places had adapted themselves to the changed conditions; and the Council could depend upon it that in this matter the interests of the consumers would be safeguarded. They would be treated as customers; and they would not do anything which drive their customers away. They had had an inquiry on this very point from the Company which was the largest consumer in the town; and he believed the Gas Engineer had satisfied that Company that their interests would be safeguarded.

Mr. TRAVERS asked what promise they had from the Government that any loss which the scheme involved, or cost incurred, would be made good.

Mr. G. DAVIES inquired what percentage of toluol was at present being taken out of the Widnes gas per ton of coal carbonized, and also what the percentage would be under the proposed scheme.

Alderman TIMMIS replied that the Government did not give any guarantee that cost or losses would be made good. He could not reply definitely to the other question at the moment. There was some toluol being taken out now; and what the increase would be, he did not know. Widnes was not singled out in this matter. The same request was being made to towns throughout the country.

Alderman G. I. NEIL remarked that he had moved the amendment at the last meeting; and he still regarded it as a very serious matter. Gas-engines in the town to-day were short of power; and he did not know what it would come to if the gas power were further reduced. They had to take into consideration the fact that their lighting would be reduced 50 per cent. It was not so much the price of the plant, as the serious inconvenience which the town would be compelled to put up with. Widnes was not a very large town; and there were larger towns which had not yet adopted such a scheme as was proposed. He did not think that the war would last long; and probably it would be over before the plant could be erected. There were large cities and towns in France; and why could they not produce toluol as they were doing in England? Under these circumstances, he moved that the recommendation be deleted from the minutes.

Mr. SQUIRES seconded; stating that he did so even at the risk of being considered unpatriotic. A struggle had been going on in his mind for the last few weeks as to what was their apparent duty to the State, and what was their real duty. If Widnes was a residential town, he did not think that any member of the Council would take exception to the introduction of the process. But they had to rely largely upon the works of the town for their livelihood; and they knew what would happen if they reduced their lighting and power. He would not say much about the power—that, perhaps, they could put up with—but if they reduced the lighting more than at present, they were going to have a very dangerous situation. The works were not now lighted as factories should be lighted; and in his opinion, they would be doing there duty to the State as much by keeping things going as by extracting toluol.

Mr. TRAVERS remembered that at the last meeting it had been proposed to take out 50 per cent. of the lighting power of the gas. How they proposed to do this and still not jeopardize the lighting in the manufacturing places of the town, he could not understand. He did not think the gas would stand the reduction; and they had at the present time hundreds of complaints. They would have the gas-works on their hands, and be supplying no gas.

Alderman F. NEIL said he thought there was a misunderstanding. He quite admitted what Mr. Squires had said; but at the same time he wished the whole of the members of the Council had been present at the meeting of the Gas Committee, because it was very likely that, having heard what was said there, this discussion would not have been necessary. They were assured by the Gas Manager that there was a method of lighting the works which would make the reduced gas quite adaptable for the purpose. With regard to the letter in the minutes, might he draw their attention to the paragraph in which reference was made to compulsory powers. They did not like compulsion, and did not want it. If they put this scheme into operation to increase the output of toluol, they would help their lads at the front better, perhaps, than in any other way. They would be sorry if this recommendation was rejected, and then at an early date they were compelled to do the thing they had refused to do voluntarily. Even if it did decrease the value of the light, they had got to use more of it and pay more for it; and that was their portion in this great war. He was an opponent of the recommendation at the beginning; but he had heard the matter fully discussed, and had come to the conclusion that they ought to adopt the recommendation, particularly as it would be put into operation gradually.

The EX-MAYOR hoped the amendment would not be carried. There would be inconveniences; but they surely could not weigh in a matter of this kind. The national duty was paramount.

Mr. G. DAVIES asked whether it was not a fact that at the present time they were extracting something like 8 lbs. of toluol from every ton of coal carbonized. This being so, using 40,000 tons of coal per annum they would extract some 320,000 lbs. of toluol; and therefore it did not appear that Widnes was so unpatriotic. One of the highest authorities in the profession of gas engineering, Mr. Charles Carpenter, D.Sc., had written to the Technical Press pointing out that they could not take out of their gas all the illuminant and some of the heat, and expect to retain their business. Widnes was doing all that was fair in the direction desired. The letter in the minutes had impressed him at first; but after reading the one written by Mr. Carpenter, he thought it wise that the matter should be further considered.

Mr. MILLAR said if he were challenged to prove the poor quality of the gas at present, he could do so up to the hilt. What they wanted to know was whether the position of the large number of consumers in the town as it stood at the moment had been laid before the Ministry of Munitions. They were not afraid of compulsion. Men had been compelled to go; and if the gas-works were taken over by the Government, one of the first things to be done would be to regulate the gas supply so as to maintain the fullest output from the town's industries.

Mr. TURTON urged that the matter of the lighting of the works was not as important as had been made out. The majority of the plants were lighted by electricity and "duck" lamps.

Mr. HARDMAN said that he still supported the recommendation. Any scheme which came from the Gas Committee was almost condemned before it reached the Council. It was unfortunate that this occurred in regard to a big undertaking. There was a great deal of resentment when any scheme was brought forward for the gas-works. He believed that all the difficulties suggested could be overcome by arrangement.

Alderman T. SMITH said that he regarded the matter as a call to duty. They had been asked by the Ministry of Munitions to put forth all their energy to defeat the foe. What did it matter what other towns were doing? Why should Widnes not lead the way?

The MAYOR (Mr. J. Hedley) said he was as patriotic as anyone in the room. He did not, however, think this was a time for the scheme to go on; and he supported the amendment.

Alderman TIMMIS, in reply, remarked that most of the towns of which he knew were considering the matter as Widnes was doing. The only speech which required an answer was that of Mr. G. Davies. He had built up a statement on a letter written by Mr. Carpenter; but what this opinion had to do with the question before them, he did not know. Mr. Davies's figures were only correct up to a certain point. What Widnes was actually doing was taking 8 lbs. of toluol per ton of tar; and it took 20 tons of coal to make a ton of tar. Widnes gas contained at present four times as much toluol as they were now taking from the gas, and sixteen times as much benzol. If they were to take the whole of the toluol and the whole of the benzol out, they would lose the 50 per cent. of illuminating power mentioned by the Engineer last month. The Gas Committee's proposal was a business one; and they intended to do nothing that would cause them to lose their customers. As he had previously mentioned, they had satisfied the largest consumer in the town. Mr. Carr had explained to the firm that they would do nothing which would prevent their customers using gas. If they did, they would bring their customers to a standstill, and they would also defeat the object of the Ministry of Munitions, because if they did not produce gas they could not extract toluol. They would commence the scheme gradually and feel their way. The Ministry of Munitions had put it to the Council very clearly. If they did not give it voluntarily, it would perhaps be taken.

The voting was then recorded by card; the amendment being carried by ten votes against eight.

A Frank Local Criticism of the Decision.

Referring to the matter under the heading of "Widnes 'Patriots,'" the local "Weekly News" of Friday's date says:

It is some time since the Widnes Town Council came to a decision

with matter for as much comment in the town itself, and even beyond, as the one come to on Tuesday. To flout the Ministry of Munitions in such resounding days as these, when super-preponderance of artillery is the undoubted key to victory, is not an action which can be hidden in the Widnes Council Chamber or whispered on the local hearthstone. Either the Ministry's letter is an empty threat, an exaggerated claim, made or manipulated by people with faddist or mercenary interest in the scheme they advocate, or it is the deliberate pronouncement of a Government Department, aroused and resolute, with whom lies the task of first equalling and then surpassing the war output of an enemy whose preparations and resources have impressed the world. It will not be difficult for people detached from the influences which complicate gas-works discussions in the Council to arrive at a right decision on this elementary point. Reflecting on the cheerful sacrifice and sustained efforts which are being made from North-West Canada to Further India, and beyond to the Antipodes, and glancing at the columns of casualties which are darkening Widnes homes this week, it appears a very easy thing which the Widnes Town Council and the folks at home were asked to do. And so obstinate a refusal will certainly be used in evidence against aldermen and councillors when the Widnes men who are enduring in France to-day return to civil life. Their contact with war's realities will give them a directness of mind and manner which will assess Tuesday's decision as actuated by the small, mean parochialism which would not suffer its gas-light to be dimmed when the Allied offensive begun.

For, set beside the paramount necessities of the military situation, the absurdly local arguments that Widnes will be inconvenienced, or that lighting in some corner of a works will be unsatisfactory, are too transparently feeble to maintain a face at all. Had the opposition been sincerely anxious to realize the need of the Ministry of Munitions, any fears for the local position would have been at once dispelled by Alderman Timmis's announcement that the United Alkali Company—there is no need to make a secret of what is not a secret—had been satisfied on this very point. So that this distressful concern—lest something happen which the Ministry of Munitions, of all people, are most vitally interested in seeing does not happen (because of the war work being done in Widnes)—is just beating the air with a sledge-hammer. However jealous of their patriotism those who defeated the proposal may claim to be, it was patriotism of no very sturdy quality which could be satisfied with such thin arguments.

GAS CONSUMPTION FOR POWER AT BRADFORD.

At a Meeting of the Bradford City Council last Tuesday, Mr. J. H. Barraclough submitted the minutes of the Gas Committee, and replied to various questions put by Mr. Walker Sutcliffe.

Mr. Barraclough said that the number of firms who had taken advantage of the reduced price of gas for motive power, and had introduced gas-engines since July, 1913, was 138. The quantity of gas used by engines in 1912 was 92,446,000 cubic feet; in 1913, 103,664,000 feet; in 1914, 93,045,000 feet; and in 1915, 96,269,000 feet. Fifty firms during the same period had installed electric drive as a substitute for gas; and they had used previously 19,075,700 cubic feet of gas per annum. In the period during which these losses occurred, 121 new gas-engine customers were obtained, a few of whom had given up electric motors in favour of gas. No efforts had been made by the department to prevent a gas-engine being replaced by electric drive, when the latter had been obviously more suitable to the particular work. The duty of the Corporation was to supply the ratepayers' requirements, and to give electricity instead of gas where it suited the purpose better. Indeed, the Gas Committee had themselves already installed thirteen electric motors on the new plant at the Birkshall Gas-Works. Mr. Sutcliffe had asked, "seeing that the Committee were fortunate in having good stocks of coal during the past year, having bought before the general advance of 5s. per ton, what would be the financial position at the end of the present year, when the old contracts were exhausted, and coal must be bought at prevailing prices." As to this, it simply could not be said what would be the financial position at the end of the year. It was impossible to tell what coal would cost them, and what would be obtained for residuals. Present prices gave little guidance; and there was no knowing what would happen in other ways during the war. On another point, he mentioned that the quantity of gas used for street lighting was 82 per cent. less than in the previous year.

Mr. Sutcliffe's last question was: "In view of the unsatisfactory condition of the Corporation gas undertaking, and the considered excessive number of nine gas-works for supplying the city's needs, will the Committee take into early consideration the question of centralizing the whole of the Corporation gas-works in the four old works—Thornton Road, Valley Road, Mill Street, and Birkshall? Also, with a view of much greater economy in working and administration, will they consider permanently closing-down the whole of the suburban works, only retaining what gasholders are necessary for storage purposes?" Mr. Barraclough said he took exception to the first statement in the question. The gas undertaking was not in an unsatisfactory condition. The present financial position was entirely due to the war, and was much better than was expected. It had always been intended to dismantle the smaller works whenever it became advantageous to do so. Gas manufacture in the city had been largely centralized since the outside works were taken in fifteen years ago. New vertical retorts were in course of erection at Birkshall; so that five smaller works could be closed. This would have been completed, but for the war. At one of the outer works, no gas had been made for four years past; at another, for three years; and at two of the other remaining ones, for one-and-a-half years.

The minutes of the Gas Committee were then adopted.

Distillates Limited.—A Company with this title has been registered to carry on the business of chemists, chemical manufacturers and dealers, and distillers and refiners of coal tar and other products. The capital is £5000, in £1 shares; and the registered office is at Minerva Works, Kirkheaton, near Huddersfield.

BIRMINGHAM GAS AND WATER ACCOUNTS.

The City of Birmingham financial "Blue-Book," a copy of which, for the year 1915-16, has been received from Mr. Thomas H. Clare, the City Treasurer, is accompanied by the usual epitome, which contains the following figures relating to the gas and water accounts.

In the Gas Department, the revenue account shows a balance of income in excess of expenditure of £164,788 for 1915-16, carried to the profit and loss account. After providing for annuities, interest, and redemption of debt, the balance of the profit and loss account was £26,274. The amount of capital expended during the year was £22,354. The total expenditure on capital account to March 31 was £2,647,102. The amount standing to the credit of the reserve fund was £90,441; while the gross total of loans negotiated, including annuities, was £2,938,949. The sum provided from revenue for the redemption of debt in 1915-16 was £57,607; and the gross amount provided for redemption of debt to the end of the year was £1,240,299. The balance of loans remaining to be provided for was £1,698,650.

The revenue account of the Water Department for 1915-16 shows a balance of income in excess of expenditure of £265,365, carried to profit and loss account. The profit and loss account shows a loss of £85,723, which has been provided for as follows: Contribution from the borough rate, £45,000; balance carried forward, £40,723. The amount of capital expended during the year under the 1892 Act was £16,365. The total expenditure on capital account to March 31 under the 1875 and 1879 Acts was £2,097,860; and under the Act of 1892, £6,331,670. The gross amount of loans negotiated, including annuities, under the 1875 and 1879 Acts, was £2,097,860; and under the 1892 Act, £6,327,500. The amount provided from revenue for redemption of debt during the year, under the 1875 and 1879 Acts, was £22,441; and under the 1892 Act, £17,188. The gross amount provided for redemption of debt to the end of 1915-16, under the 1875 and 1879 Acts and the 1892 Act, was £445,394. The balance of loans to be provided for under the 1875 and 1879 Acts, was £1,767,282; and under the 1892 Act, £6,212,684.

OSSETT GAS-WORKS RESULTS.

Success of the Vertical Retort Installation.

A review of the gas-works results for the past financial year was given by Alderman H. Robinson (the Chairman of the Gas Committee) at the last meeting of the Ossett Town Council. The figures are more than usually interesting on the present occasion, as they relate to the first full year's working of the intermittent vertical retort installation erected by Messrs. Goodall, Clayton, and Co., Limited, of Leeds. The whole of the gas has been made by this plant, which has worked very well indeed, and never given a minute's trouble.

Alderman Robinson, in proposing the adoption of the Committee's minutes, said that the war, which had affected them in a dozen ways, and inexperience of the new vertical plant, had combined to make the year a very anxious one, yet he had no hesitation in saying it had been one of the most successful years. With the exception of make and sale of gas, they were in advance of any previous year. The make and sale was up by nearly 3000 cubic feet per ton of coal. The receipts from residuals had increased by £1330. The leakage was down in the aggregate, the number of customers had increased by 124, the receipts from the sale of gas showed an increase of £2747 (owing to the increased price), and the gross profits were higher by £2387. The last item was an absolutely real and true balance; and the stability of the works had not been sacrificed, nor stocks inflated, in order to obtain it. Stores, meters, and new mains had been taken out of revenue which could have been placed legitimately to capital account to the extent of £500. The same applied to new stoves to the value of £200. The coal stocks had been depreciated by £220. It might have proved to be serious if they had done otherwise. These items, and some others (they were not all), amounted to £1340; and to this extent they could have increased the gross profits. He referred to the eminent services of the Gas Engineer and Manager (Mr. A. E. Mottram) and the consistency and trustworthiness of the entire staff; and then went on to further analyze the year's results. The gas made, 153,995,000 cubic feet, for the first time showed a decrease—viz., 1,716,000 feet—and the decrease in the gas sold was 1,391,200 cubic feet. The unaccounted-for gas, 11,862,000 feet, was 8 per cent. of the make, and a reduction of 324,800 feet, which was very satisfactory. Notwithstanding doubled consumption and nearly double the length of mains and greater pressure, the leakage was less by more than 1,500,000 feet than in 1901. With regard to residuals, the coke sold amounted to 5810 tons, against 7116 tons. Prices had been favourable, the receipts being £4286, against £3625. Although the price of coke had been increased, it had always been below the average for the country, which was 19s., against 17s. 6d. at Ossett. The whole of the coke was sold within the gas area, although offers at a much higher price had been received repeatedly. A new plant had been put in to dehydrate the tar and recover the light oils; and at the request of the War Office, it had been extended so as to recover the benzol as well. A letter of thanks had been received from the Government for what had been done. Apart from war requirements, he had great expectations of the new tar plant, and hoped to find a market for all the tar within the gas area. It was too early to speak of financial results; but they exceeded by a long way the price which they had in the past obtained for the crude tar. Of coal, 10,818 tons had been carbonized, against 13,520 tons. The decrease was accounted for by the fact that they made 2723 cubic feet more gas per ton of coal. The cost of the coal was £8672, against £8336. Thus, 2707 tons less coal had cost £336 more. The make of gas per ton of coal had been 14,235 cubic feet, against 11,512 feet. A year ago he said that 14,000 feet per ton was the minimum; and so he still regarded it. With the decreased gas consumption of nearly 1,500,000 cubic feet, the receipts for gas were higher by £2747. This was owing to the increase in the price, which produced £2337, and the decrease

in discounts, which saved £411. The expenditure, £21,646, was an increase of £1847; and the gross profit of £7668 was an increase of £2387. War allowances and bonuses amounted to £460 more than last year. Interest and sinking fund required £2333 more this year than last. During the year, £3038 had been added to the capital account, making £53,389 added since the works were purchased. The net capital now stood at £135,525. More had been added than redeemed by £25,290. Had they value for all this money? They had a plant which left nothing to be desired, with a producing capacity increased by 100 per cent., with greater economy in working; the mains had been practically doubled in length and increased in size; and the leakage had been reduced from 15 to 8 per cent. The capital per 1000 cubic feet of gas made had decreased from 32s. 5d., when the works were purchased, to 17s. 5d. last year. But owing to the decreased make of gas, the figure was now 17s. 7½d. Similarly, owing to the saving in coal due to the new plant, the capital per ton of coal used, which was £14 13s. 11d. in the first year and £10 last year, had risen to £12 10s. 7d.

The Engineer's Report.

Mr. Mottram, in his report to the Committee, pointed out that the decreased output was entirely due to the abolition of street lighting—over 7,000,000 cubic feet less being used for this purpose. The ordinary meter consumption also showed a slight decrease owing to shop-window lighting restrictions. The consumption by slot-meters, engines, and cookers showed a satisfactory increase of 6,000,000 cubic feet. After deducting from the gross profit interest and sinking fund charges, there was a balance to carry forward of £117. Ordinary meter consumers now number 4658, and slot consumers 4344.

Mr. Mottram further remarked that "the new retort-house plant has worked throughout the year very satisfactorily; and the results have exceeded expectations. It has proved doubly valuable owing to the war conditions, as stokers could not have been obtained to work the old plant, nor could enough coal have been carted in, but for the railway siding; and the 2500 tons of coal saved by the greatly improved carbonizing results would have had to be bought at a very high price." The coke made per ton equalled 13·9 cwt., or 69·5 per cent. Coke sold, 10·7 cwt., equalled 53·5 per cent. Coke used in boilers, 0·8 cwt., equalled 4 per cent. Coke used as fuel for retorts, 2·4 cwt., equalled 12 per cent. Not correcting for stocks for tar and liquor, the quantity sold per ton equalled: Tar, 15·9 gallons, and liquor, 38 gallons.

The New Tar Dehydrating Plant.

An inspection by representatives of the local authorities in the gas supply area was made last week of the tar dehydrating plant installed a couple of months ago, at a cost of £550; the construction and operation of the apparatus being explained by Mr. Mottram. After the inspection, the visitors were entertained at tea in the Town Hall—Alderman H. Robinson presiding. It is stated that the plant has proved satisfactory in every respect, and will be a profitable investment after allowing for interest and sinking fund payments and working expenses.

MALTA AND MEDITERRANEAN GAS COMPANY.

Enormous Rise in Freights.

The Ordinary General Meeting of the Company was held last Tuesday, at the London Offices, Nos. 59-60, Gracechurch Street, E.C.—Colonel Stephenson R. Clarke, C.B., in the chair.

The Secretary (Mr. C. J. Daun) read the notice convening the meeting; and the report of the Directors and the statement of accounts were taken as read.

The Chairman said he regretted that Colonel Daniell (the Chairman), who had passed fifty-five years in the service of the Company, was on this occasion not well enough to be present. Proceeding to move the adoption of the report and accounts, he said that the past year had been a very strenuous one for those who had had to conduct business in this country, though their modest efforts were naturally overshadowed by the efforts of those who, in a greater field, had so nobly sustained the Empire in the war. The difficulties that had had to be faced by the Directors had been principally due to the gigantic rise in freights to Malta. It was true that there had also been a considerable rise in coals—in normal times, they would call it a very considerable rise; but compared to that in freights, the increase in the f.o.b. price of coals was comparatively slight. Freights had risen to eighteen or twenty times the normal—say, from 5s. to 95s. per ton; and in order to obtain some compensation for this huge increase in cost, the Directors had raised the price of gas in Malta 2s. per 1000 cubic feet. An increase in the Company's business had been secured, due to the island being used as a war base, of about 23 per cent. on the quantity of gas sold; a great deal of this being due to the larger consumption throughout the military hospitals. The increase in price, however, was not sufficient to fully compensate for the increased costs; and the Company had closed the year with a net profit of £6388, against a profit last year of £7335. This sum, however, the Directors hoped the shareholders would regard as satisfactory under the abnormal circumstances. It must be remembered that the Company began the year with a considerable stock of cheap coals; otherwise the results obtained would have been impossible. As they had no such good fortune to help them during the ensuing year, the difficulties of the situation had become much accentuated; and unless some relief could be obtained from the weight of these immense freights, it would become quite impossible to conduct the business of the Company without still greater increases in the price of gas. The shareholders might be interested to learn that the cost of coal, oil, coke, and freights had increased from £14,052 to £33,111; the maintenance charges had gone up from £4471 to £6973; and loss on exchange from the Sicilian stations, from £366 to £1197. Depreciation of investments and the loss on conversion of Consols had again involved them in a drop of £1648. On the other side of the account, sales of gas and coke had increased by about £20,000; and the busy trade carried on by the

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The Quietus.

¶ In the Davis new "EFFICIENCY" Cooker, the Gas Industry will have a decisive weapon for the final overthrow of its *bête noir*—the moribund but reluctant-to-pass Coal Range.

¶ Not only will the new stove show itself superior, in point of thermal efficiency, to anything previously conceived, but the constructional innovations embodied are such as to mark a significant step forward in the practical application of science to manufacture.

¶ These improvements—the result of THREE YEARS' untiring laboratory research—are protected by Royal Letters Patent, and will therefore be exclusively DAVIS.

fittings department was marked by a rise from £3389 to £3980. In the period under review, the works, buildings, and machinery had all been well maintained. The make of gas per ton of coal carbonized was 13,065 cubic feet, and the quantity sold 11,525 feet. The unaccounted-for gas was higher than could be considered satisfactory; but every effort was being made to reduce it. The enhanced price of the raw materials necessitated the employment in the business of a far larger sum as working capital than had ever previously been required; and as it was possible that in the future the Directors might prefer to borrow money from their bankers, rather than sell the securities held, they had thought it well to ask the approval of the shareholders to this course. This would be done at an extraordinary meeting.

Mr. A. M. PADDON formally seconded the resolution, which was immediately passed by the meeting.

On the proposition of the CHAIRMAN, seconded by Mr. A. W. OKE, dividends were declared at the rate of 7 per cent. on the first preference shares, 7½ per cent. on the second preference shares (less income-tax), and 6 per cent. on the ordinary shares (free of income-tax).

The CHAIRMAN moved, Mr. F. R. SMITH seconded, and it was agreed, that Mr. Paddon be re-elected a Director of the Company.

Mr. PADDON, in acknowledgment, said he looked forward to his next term of office with something very far removed from a light heart. Probably the shareholders had noticed that in the gas industry adverse circumstances did not always reflect themselves immediately in the accounts; and those who were not familiar with the peculiar attributes of the business were apt to think they were out of the wood just when they were really walking into it. He was afraid this condition of affairs must to some extent characterize the gas industry in the period before them. Of course, if they could come safely through another twelve months, they might be able to reassure themselves; but he thought the proprietors should feel, as he himself felt, that the darkest hour of night was at hand, and that there was a good deal to be gone through before they could hope for any improvement.

The Auditors (Mr. E. L. Burton and Mr. William Cash) were then re-appointed, on the motion of Mr. DODGSON, seconded by Mr. WILLIAM RICHARDS.

Extraordinary General Meeting.

The CHAIRMAN said the meeting would now be made an extraordinary one, for the purpose of passing two resolutions: (1) "That article 36 of the Articles of Association be altered by omitting from the first and second lines thereof the words 'with the sanction of an extraordinary general meeting.'" (2) "That article 85 of the Articles of Association be altered by adding immediately at the end thereof the words 'including power to raise or borrow or secure the payment of any sum or sums of money with or without security, for the purposes of the Company.'" The reason for these resolutions was that, owing to the enormous rise in the price of raw materials, the Company required more working capital. They were able to raise this working capital now by selling the securities the Company owned, but they could not raise it by borrowing on these same securities at the bank. He moved the resolutions.

The SOLICITOR (Mr. J. B. Hartley) said the resolutions explained themselves. As to the first, the Directors could not at present borrow money, even quite small sums, from the bankers without first calling an extraordinary meeting to sanction the loan. The alteration in article 85 was really following out the same idea, by extending the powers given to the Directors to borrow money.

Mr. PADDON seconded the resolutions; and they were carried without discussion.

VOTES OF THANKS.

Mr. SMITH, in proposing a hearty vote of thanks to the Chairman and Directors, said he had been much impressed by what Mr. Paddon had remarked; and he was wondering whether it might not have been well to anticipate coming events a little by reducing the dividend on this occasion. The shareholders were prepared for it; but no doubt the Directors had given the matter their careful consideration.

Mr. BURTON seconded, and pointed out that the Board were to be congratulated on bringing forward the matter of borrowing. It was somewhat extraordinary that a company of this size should not have had these powers before. They would simply bring them into line with other joint-stock undertakings. It would be of assistance to the Board to have these powers, especially at times like the present.

Mr. DODGSON suggested, and it was agreed, that the vote should include the Secretary and staff on this side and abroad.

The CHAIRMAN, in reply, said the Board did consider whether it would be advisable to reduce the dividend; but they thought the more courageous course was to wait until the evil times got still nearer. At present, the outlook was not so rosy as it was last year. In fact, it caused the Board a very considerable amount of anxiety.

PRICE OF GAS AT DEVONPORT.

At the Meeting of the Plymouth Town Council on Monday of last week, Alderman Tozer (the Chairman of the Gas Committee) moved the confirmation of the minutes of the Committee, which recommended an increase in the price of gas in the Devonport area from 2s. 7d. to 2s. 11d. per 1000 cubic feet to ordinary consumers, from 2s. 4d. to 2s. 8d. for power purposes, and a reduction of the quantity supplied to slot consumers from 25 to 21 cubic feet for 1d.

Alderman Tozer said that the gross profit of the undertaking had fallen from £22,019 in 1914-15 to £19,159 in 1915-16. This was due to increased charges which had occurred since the war. The cost of coal last year was £8500 more than in the year before; while oil cost £3600 more, wages £2500 more (due to the war bonus), and income-tax £1400 more. The total increased expenditure, compared with the

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SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

normal, was £16,000. Towards meeting this there was £4000 profit made in 1914-15, an increase in the receipts from residuals, and an advance in the price of gas of 3d. per 1000 cubic feet six months ago. It should be borne in mind that there was a great difference between a gas undertaking worked by a corporation and one operated by a company. The Corporation had to pay a large sum of money annually in redemption of capital outlay. In the past year, they had to find £9000 for this purpose. If they could have retained this sum as floating capital, as a company would have done, they would have lessened the price of gas by 4½d. per 1000 cubic feet. Before deciding to increase the price of gas, the Committee had gone very carefully into the matter, and had come to the conclusion that, with the enhanced price of coal and oil, it was necessary to raise the price 4d. per 1000 cubic feet. They believed that with this amount they would be able to meet all the additional expenditure during the coming year. In one respect they hoped to benefit. As the Chairman of the Plymouth Gas Company stated recently, gas undertakings had been at the mercy of tar distillers. The Plymouth Company were endeavouring to get out of this position, and the Committee hoped to do the same. If they could not secure fair and reasonable terms—which they anticipated they would do—they would provide a plant of their own for dealing with tar; and they were satisfied that they would soon meet the expenditure, and obtain better value for their tar. The Committee were proud of the fact that in these abnormal times the price of gas in Devonport district was very little more than in the Plymouth area. When they returned to normal times, he was satisfied that, with their improved plant and working, there would be no great disparity between the price of gas in Plymouth and Devonport; and he hoped that in due course, when the capital outlay on the Devonport undertaking was redeemed, the Devonport area would be supplied even cheaper than Plymouth.

The minutes, which were confirmed without discussion, included, in addition to the recommendation as to the price of gas, a resolution instructing the Town Clerk to make application to the Local Government Board for power to borrow £15,000, to meet the estimated expenditure during the next three years for the purchase of gas stoves, meters, and automatic installations. The last loan for this purpose was also £15,000, and was sanctioned in February, 1913.

HEYWOOD CORPORATION GAS-WORKS.

In his report to the Gas Committee on the operations for the year ended March 31 last, Mr. W. Whatmough, the Engineer and Manager of the Heywood Corporation Gas-Works, says that there was a gross revenue of £25,363, and a gross profit of £6130, which was £64 less than that for the preceding year. After payment of interest and sinking fund charges, there remained a net profit of £171. Receipts for gas sold for all purposes were £19,553, compared with £18,220; the increase being due to higher charges for gas. Residuals realized substantially more; and purification for the first time shows a balance to credit, owing to the increased price obtained for spent oxide.

During the year, 11,754 tons of coal and 15 tons of cannel were carbonized; but though the cost was 5s. per ton more, expenditure on the manufacture of gas rose by only £1425. There was a make of gas per ton of coal carbonized of 12,033 cubic feet; the figure for the previous year having been 12,190 feet. The total quantity of gas sold as registered by consumers' meters was 128,367,038 cubic feet—a decrease of 3,750,758 feet; while the leakage was 7·48 per cent. The decrease in consumption for public lighting was 2,722,016 cubic feet.

A further advance in wages has been conceded to the workmen; and during the period of the war an amount equivalent to holidays with payment has also been granted to stokers and other employees, according to conditions of service. The net result of the year's working is, Mr. Whatmough says, more favourable than was anticipated, owing principally to the saving in the estimated increased cost of manufacture and the additional revenue from residuals.

LEEK ELECTRICITY GENERATING PLANT.

Gas Engineer to Take Control.

A report by Professor Watkinson to the Leek Urban District Council on the condition of the generating plant at the electricity station having been considered, it was decided that the Gas Engineer (Mr. R. H. Ginman) should be instructed to assume control of the producer-gas plant there. This having been done, the Electrical Engineer tendered his resignation, which was accepted.

At a recent meeting of the Council, Mr. W. A. Furmston (the Chairman of the Lighting Committee), referring to the matter, said he thought no one could read Professor Watkinson's report without coming to the conclusion that it was unfortunate they had not had expert advice before the existing plant was installed some ten years ago. Owing to the war and the great rise in the price of materials, as well as the improbability of the Council being able to obtain a loan at present, the Committee were not in a position to carry out Professor Watkinson's suggestions at once; but they wished to undertake such portion of them now as would not interfere with the completion of the scheme at a later period. He had asked the Professor's opinion on four suggestions: (1) Was it advisable to scrap the whole of the present plant and replace it by a steam-driven one? (2) Was it desirable to scrap the gas-producer plant, and return to town gas? (3) Should a new and up-to-date producer plant be installed? (4) How could the present plant be most satisfactorily dealt with? Their plant could not be entirely remodelled now, owing to the difficulty of obtaining new capital. Further, their expert did not advise a steam plant for a station the size of Leek. The suggestion to return to the use of

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town gas was greatly favoured by the Committee; but it was necessary to continue the producer system at present. The increased cost of machinery prevented them from installing a more modern type of producer plant, which they would much like to do. Therefore they had decided to take the course of putting the Gas Engineer in charge of the gas-producing plant; and already he had been able to show very satisfactory results in decreased cost of working. It was confidently hoped that as time went on further improvement would be effected. The Committee, however, intended to put down, as soon as ever they could obtain one, a new gas-engine of the most modern type, and so constructed as to work on either producer or town gas with very simple alteration. The Committee had decided that, as they were retaining the system of a producer plant, it would be better to put the whole of the production under the care of the Gas Manager, who had a full knowledge of the producer-gas system, as well as of gas-engines. He also had a fair knowledge of electricity work. The combination of the two departments must lead to various economies, and would no doubt be beneficial all round.

It was agreed that Mr. Ginman be appointed General Manager of the electricity station, and that a chief assistant be selected.

WANGANUI (N.Z.) GAS UNDERTAKING.

In his last annual report to the Council, Mr. G. D. Stone, the Engineer and Manager of the Wanganui (N.Z.) Gas-Works, stated that the gross profits for the twelve months under review constituted a record, amounting to £14,467, which was an increase of £4567 over the previous year. On the other hand, the increase in the output of gas had been the smallest experienced since the works were acquired from the Company. The smallness of the increase (1½ per cent.) was attributed partly to not so many new buildings as usual having been erected. However, though 559 tons less coal had been used than in the previous year, the quantity of gas made was more by nearly 2,000,000 cubic feet, while the sales of coke had increased by 12,000 bags. The increase in the profits was chiefly due, first to an improvement in the coal, and secondly to the operation of the Woodall-Duckham vertical retorts. There was a very substantial saving in wages as compared with the previous year. After payment of £6844 in interest and sinking fund, there was a net profit of £7623. Of this, £4000 was handed over in relief of the rates, and £2044 devoted to extensions of plant, mains, &c., leaving a surplus of more than £1579. There was a further sum of between £600 and £700 spent on the public lighting, which the department did not get credit for. An inquiry which had been held into the administration of the undertaking had cost in extra coal, labour, and experts' fees over £450; thus reducing the profits to this extent. The average make of gas per ton of coal carbonized for the year was 14,281 cubic feet.

It may be added that, in connection with the inquiry referred to, exhaustive and valuable reports were submitted to a Commission by Messrs. Atkinson and Sons, of Auckland, and Mr. F. J. Kennedy, of London. After considering these and other documents, and hearing witnesses, the Commissioners made various recommendations. They also said: "We are of opinion that Mr. Stone's management of the works has been careful and efficient. Nothing transpired during our sittings to justify a different conclusion."

A NEW BASIS FOR SELLING GAS AT CHICAGO.

The Peoples Gaslight and Coke Company of Chicago are proposing a single calorific standard for the value of their gas, in place of the double one at present in use, which includes a minimum 22-candle power. If this is accepted, it is intended to substitute coal gas for carburetted water gas, and to introduce a selling-price schedule based on quantity consumed combined with a minimum charge, extending over five years. In a memorandum issued to their customers, after explaining the altered conditions that followed the introduction of the Welsbach burner, and the increased use of gas for cooking and fuel purposes, they remark that the present high illuminating standard necessitated the use of oil for enrichment; and within the last year the price of enriching material has doubled, though at the same time the enrichment quality has decreased 10 per cent. If the existing regulations are continued, the price of gas must be increased about 15 c. per 1000 cubic feet; but under the new plan they would propose a reduced cost, as follows:

	1916.	1917.	1918.	1919.	1920.
First 25,000 cubic feet .	78 c.	78 c.	77 c.	75 c.	75 c.
Second 25,000 cubic feet	70 ,,	70 ,,	68 ,,	65 ,,	65 ,,
Over 50,000 cubic feet .	50 ,,	50 ,,	50 ,,	50 ,,	50 ,,
Minimum charge . .	75 ,,	75 ,,	75 ,,	75 ,,	75 ,,

Optional rates to large users.

Monthly "Readiness to Serve" Charge—Minimum Charge.

Up to 100-light meter .	$12·00	Up to 300-light meter .	$27·00
150 ,, .	15·00	400 ,, .	33·00
200 ,, .	18·00	500 ,, .	37·00
250 ,, .	21·00	All larger	45·00

First 50,000 cubic feet per month, in addition to above, 50 c.
All above this quantity, 37 c.

They anticipated that the adoption of this schedule would have the effect of increasing the consumption of gas for fuel and industrial purposes, resulting in an all-round reduction of working costs, which would be assisted by the contemplated new coal-gas plant, the cost of which would be $14,000,000. The proposition was in accordance with the well-known business principle that a large parcel could be supplied at a cheaper rate than a small one, and gas was now sold on a calorific basis in no less than thirteen States.

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NOTES FROM SCOTLAND.

Kirkintilloch's Reduced Consumption.—During the past year, there was manufactured by the Kirkintilloch Gas Commissioners 80,250,000 cubic feet of gas, or 4,590,000 cubic feet less than the previous year. The restriction of public lighting involved a reduction of 2,417,300 cubic feet; and 1,207,300 cubic feet less were taken by consumers.

Working at Largs.—In discussing the question of economical working, Mr. Taylor, at a meeting of Largs Town Council, stated that, in the days of the Gas Company, it only took two workmen, including the Manager, to produce 17 million cubic feet of gas; whereas, now, under municipal control, it took a Manager and four men to produce 21 million cubic feet annually.

Pre-War Charge Maintained at Tayport.—It has been decided at Tayport to recommend the Town Council to fix the price of gas for the current year at 3s. 3d. per 1000 cubic feet—the same as last year. Satisfaction was expressed that, notwithstanding the increase of coal and labour costs, the gas account had closed with a net profit of over £30, and that the pre-war charge for gas had been maintained.

Saltcoats Gas Company.—The report dealing with the year ended May 31 last, which was adopted at the meeting of the Saltcoats Gas Company, Limited, stated that the balance at the credit of profit and loss account, after providing for depreciation on the works, amounted to £848. The Directors recommended that £800 of this should be disposed of in the payment of a dividend of 5 per cent. free of income-tax, leaving £48 to be carried forward. The increase in the price of gas, which the Directors were reluctantly obliged to make during the year, and the decrease in the rate of dividend recommended, were due principally to the increased cost of labour, coal, and other material, and the restricted public lighting necessitated by the Defence of the Realm Regulations. Mr. Thomas Kirkhope, the Chairman, had intimated his resignation from the directorate, to take effect from the meeting. Mr. Kirkhope was elected a Director in July, 1867 and had thus been actively connected with the Company for the remarkable period of 49 years, for 14 years of which he had been the Chairman. His service covered a period during which the business of the Company had considerably developed; the annual make of gas having increased by fully 30 million cubic feet. The Directors deeply regretted Mr. Kirkhope's resignation, which with much reluctance they accepted. They took the opportunity of recording their high appreciation of the services which he had so ungrudgingly rendered, and which in a large measure had been instrumental in developing the Company's business.

An order has been issued from the Ministry of Munitions including under the war material to which Regulation 30 (A) of the Defence of the Realm (Consolidation) Regulations, 1914, applies, metallurgical coke of the following classes and descriptions: Derbyshire, Durham and Northumberland, Lancashire, South Wales and Monmouthshire, Staffordshire, Yorkshire, Midland Counties.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 17.

Tar products generally continue steady, and current values are as follows: Pitch, 20s. per ton, in bulk; creosote, 4d. to 4¼d. per gallon, in bulk; crude tar, 2½d. to 2⅝d. per gallon, in bulk; 90-160 solvent naphtha, 2s. to 2s. 1d. per gallon, naked; 48-50 per cent. anthracene, 3d. per unit, casks free—all at makers' works, net cash.

Sulphate of ammonia is firmer, both for prompt and forward; and it is stated that £17 per ton, net and naked, at sellers' works, has been bid for fair quantities for near delivery.

Tar Products in the Provinces.

July 17.

There is nothing of importance concerning the markets for tar products. Pitch remains in the same position. Solvent naphtha is quiet. Heavy naphtha is in fair demand. Creosote is still very weak.

The average values of gas-works products during the past week were: Gas-works coal tar, 15s. to 19s. Pitch, East Coast, 15s. to 15s. 6d. per ton; West Coast, 14s. to 14s. 6d. Manchester; 15s. to 15s. 6d. Liverpool; 17s. to 17s. 6d. Clyde. Benzol, 90 per cent., North, 10½d. to 11½d.; 50-90 per cent. naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6⅜d. to 7d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 2½d. to 2¾d. Heavy oils, in bulk, 3⅜d. to 4d. Carbolic acid, 60 per cent., East and West Coasts, 3s. 4d. naked. Naphthalene, £35 to £45; salts, 75s. to 80s., bags included. Anthracene, "A" quality, 2d. to 2½d. per unit; "B" quality, nominally ⅜d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *July* 15.

Throughout the week the tone of the market for this material has continued very firm, and once more an advance in values has been recorded. The inquiry from abroad has only been small; but there has again been a large demand from munition works in Great Britain. The closing quotations for July delivery are £17 7s. 6d. per ton f.o.b. Hull, £17 15s. f.o.b. Liverpool, and £17 17s. 6d. f.o.b. Leith. Not much business has been reported in the forward position, but it has transpired that £18 per ton f.o.b. Leith has been paid for delivery from July, 1916, to June, 1917, in equal monthly quantities.

Nitrate of Soda.

The market for this article is without alteration, and the spot prices remain 18s. per cwt. for ordinary, and 18s. 9d. for refined quality.

The "Positive"

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RADFORD ROAD, NOTTINGHAM.

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Sulphate of Ammonia.

From another source it is stated that to-day's prices of this article are as follows: Outside London makes, £15 17s. 6d. to £16; Hull, £16 15s. to £16 17s. 6d.; Liverpool, £16 17s. 6d. to £17; Leith, £17 to £17 2s. 6d.; Middlesbrough, £16 15s. to £16 17s. 6d.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is quiet; and for some classes of coal prices are easier—buyers apparently expecting an extension of the controlled rates. But the exports to France seem to be enlarging, so that the output is well taken up. In the steam coal trade, large shipments are being made; but new sales are not numerous at present. Best Northumbrian steams are 47s. 6d. to 50s per ton—the latter being the quotation of collieries generally. Second-class steams are about 41s. to 48s. 6d. per ton; and steam smalls are fairly plentiful at 27s. 6d. to 31s.—all f.o.b. The shipments are full to Southern countries; but the market feels the loss of the demand from Russia and the North. In the gas coal trade, the tone of the market is generally steady, and large sales of coking coal have stiffened the trade of Durham. Best gas coals are about 35s. 6d. to 36s. per ton f.o.b.; second-class Durham kinds are steady at 34s. to 35s. per ton; and "Wear Specials" are from 37s. 6d. to 40s. per ton f.o.b. The gas coal collieries have full loading turns for ten days or so, and the market shows firmness for forward delivery. The large sales of Durham coal for Spain previously named are now believed to have been at 34s. to 36s. per ton f.o.b. for delivery over twelve months, and the taking up of large amounts affects beneficially Durham coals generally. Freights are rather irregular. Gas coal to Italy does not seem in prompt demand, and the freight is based on 73s. 6d. to 73s. 9d., Tyne to Genoa. The rate Tyne to London is little changed. The probability seems to be that the northern miners will work on what would have been the coming Bank Holiday. In the coke trade, the demand is heavier, and prices are firmer. The exports are above those of this time last year. Good gas coke may be quoted 34s. to 35s. per ton f.o.b. Tyne.

Enemy Business to be Wound-Up.—An order has been made by the Board of Trade requiring the winding-up of the business of the Leeds Meter Company, Limited, water-meter manufacturers, of Armley, near Leeds.

Kingstown Gas Lighting.—A new arrangement has been made by the Kingstown Urban District Council with the Alliance and Dublin Consumers' Gas Company, under which the Council are to pay £1378 annually for gas and maintenance, and 15s. per lamp for governors and burners. The agreement will be for a period of two years from last January.

Halifax Water Undertaking.—The Halifax Water Committee paid their annual visit to the Widdop and Walshaw Dean reservoirs last Friday, and the Mayor (Mr. R. Hodgson) unveiled a commemoration tablet, erected in the large committee room at Walshaw Dean, to mark the completion of the works. The tablet is in English oak, in three panels, the centre one containing the names of the members of the Water Committee and the two others the names of the remainder of the Town Council.

Barnoldswick Gas Undertaking.—The report for the year ended March 31 of the Barnoldswick Urban District Council Gas Department states that the net profit is £996. The reduction in price of 3d. per 1000 cubic feet has been appreciated by the consumers; the net prices now being 2s. 6d. and 2s. 4d. per 1000 cubic feet. The quantity of gas made was 81,571,400 cubic feet, representing an increase of 5,366,300 feet, or 7·04 per cent. over the previous year. The make of gas per ton of coal carbonized was 13,037 cubic feet, against 12,355 cubic feet, a difference of 682 cubic feet per ton, or 5 5 per cent. There are now 839 ordinary and 2329 prepayment consumers.

A Question of Gas Supply Area.—A sample of red-tape stupidity has been provided at Keighley. The Keighley Rural Council asked the Bingley District Council to supply gas to Morton Cemetery, Bingley, having a main very near. The connection was made; but the Keighley Corporation then discovered that the cemetery, though the Bingley area was only a few yards away, was just within the Keighley supply area, though the nearest Keighley main was over a mile away. The Keighley Corporation demanded a fee of 5s. per annum as recognition for the encroachment. Bingley having spent £20 in making the connection, and knowing there would be only a nominal return, stopped the supply rather than lose on the transaction every year. The Keighley Rural Council did not see that they should have to pay, seeing they had provided the Keighley Corporation with a valuable right; and the three Solicitor-Clerks have been engaged in an extensive legal correspondence on the matter, at a cost, probably, of a good deal more than the sum concerned.

Quality of Portsmouth Gas.—Correspondence between the Portsmouth Town Council and the Portsea Island Gas Company, which had been sent to the Board of Trade, was presented by the Finance Committee at the last meeting of the Council. In reply to a request that they should send down an inspector to investigate the matter—particularly on the ground that the presence of sulphuretted hydrogen in the gas constituted a serious menace to the public health—the Board stated that, in view of the explanation offered by the Company as to the presence of sulphuretted hydrogen, and their expectation that the installation of additional plant under construction, and other circumstances, would enable them to furnish a satisfactory supply, they did not think they could usefully intervene in the matter. The Committee, the report proceeded, had since communicated with the Company, and impressed upon them the absolute necessity of providing for a large stock of coal and oil, so as to avoid, as far as possible, a shortage of gas such as occurred last winter.

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Theft of Coke and its Sequel.

At the Torquay Police Court yesterday week, Walter B. Cooper, a carter, was charged with stealing a bag of coke, and William H. Milton with being an accessory to the theft. Cooper was in charge of a waggon load of coke in bags for delivery to a person who had ordered it, but on the way was seen by a policeman to stop at an inn, where he left one of the bags, saying that it was for Milton, who lived near. Subsequently he delivered the rest of the load, and, on being spoken to by the policeman, said that Milton had asked him to leave the bag on the way. The defence was that Milton, who had been in the employ of the Gas Company over thirty years, had intended to put an extra bag on the waggon for himself, but had omitted to do so, and had no opportunity of telling Cooper that it was not there. It was admitted that employees at the gas-works might have coke by arrangement and pay for it afterwards. The Magistrates fined Cooper £1, and Milton, whom they considered most to blame, £2. A sad sequel to the affair was that on Wednesday morning the body of Milton's wife was found at the foot of one of the high cliffs near the shore. The evidence at the inquest showed that she had been very much distressed by the Police Court proceedings and the disgrace which, as she said, was brought on the family. She had in consequence committed suicide.

Exmouth Public Lighting.—Correspondence with the Gas Company respecting the laying of a main to supply the lamps on the new sea-wall was recently considered by the Exmouth District Council. The Council wish to have the main laid before the footpath is paved; but owing to the restrictions on lighting, there will be no use for the lamps at present. Under these circumstances, the Gas Company proposed that the Council should pay 5 per cent. interest on the cost of laying the main, until the order for extinguishing the lights is revoked. This offer the Council accepted.

Exeter Water Supply.—The report of the Water Committee of the Exeter City Council shows that the income of the undertaking for the year ended March 31 last was £17,356, an increase of £589 upon the previous year. The expenditure was £6374; and the balance of £11,214 carried to net revenue account was an improvement of £514 on 1914-15. Loan charges increased by £180, and income-tax by £429; so that the net profit was only £1369, as compared with £1465. The Committee recommend that £1000 be appropriated to the relief of the rates. A new electric pump was formally started on the occasion of the Water Committee's recent annual inspection of the works. The plant was supplied by the Rees-Roturbo Manufacturing Company of Wolverhampton, and is capable of delivering 25,000 gallons per minute against a head of 325 feet when running at 1720 revolutions per minute. A British Thomson-Houston motor of 63 B.H.P. supplies the driving force. A suction well to serve four pumps has been constructed; and the whole of the work, including the erection of the plant, has been carried out by Mr. A. Kneel (the Water Engineer), under the direction of the City Engineer.

Salonica Gas Supply.—Cuttings have been forwarded by Mr. W. M. Valon, of Stafford, from copies of the "Balkan News" sent to him by one of his men who is serving with the forces there. In one issue, the Salonica Gas Company gave notice that the supply of gas would be cut off after June 7; in the other the Company announced that, "thanks to the generous assistance of the Allies, they need not cut off the gas supply as was previously announced."

Tar Oils for Diesel Engines.—In the Patents Court last Thursday, Mr. Napier Prentice applied, on behalf of the Suffolk Electricity Supply Company, Limited, for the avoidance or suspension of the patent of Konrad Aust, or alternatively for the fixing of a royalty payable under the patent, which relates to apparatus to permit of the use of tar oil in Diesel engines. He pointed out the present difficulty of obtaining fuel oil, and stated that the use of tar oil offered a secure supply of fuel, and reduced the cost to almost one-half. Further, he pointed out that national interests would be served by encouraging the use of tar oil in Diesel engines. The application was opposed by Messrs. Mirrlees, Bickerton, and Day, Limited, who were, prior to the war, the sole licensees under the patent. The decision will be made known in due course.

Walsall and Gas Profits.—Yesterday week, at a meeting of the Walsall Town Council, Mr. J. Venables moved the adoption of the annual balance-sheet of the gas undertaking, which, he said, showed a net profit of £7560, out of which it was proposed to allocate £4000 in relief of the rates, and carry forward the balance of £3560 to the next account. The undertaking had been carried on under exceptional difficulties owing to war conditions; and he claimed that it had done well. With regard to the future, it was estimated that the Summer Time Act would lead to a reduction in the output of from 8 to 10 per cent. Mr. Thickett moved, as an amendment, that the profit be utilized in reducing the price of gas—contending that it was unfair to the poorer section of the community that municipal undertakings should be run for profit earning. After discussion, the amendment was defeated and the report approved.

Gas Tragedy at Nottingham.—The Coroner's inquiry into a terrible tragedy at Hyson Green, Nottingham, elicited the fact that hereditary insanity may have led to the occurrence, the victims of which were Mrs. Rowland (aged 30) and two of her children, three and two years old respectively. Another young child, though unconscious when found, afterwards recovered. The husband of the woman is serving with the Colours. It appears that the family occupied a bedroom in which there was no fire-grate, and that all orifices had been closed. As they had not been seen for some while an entrance was forced, and the place was found full of gas, which had been escaping from a pipe that had no bracket attached to it, and the brass cap of which had been removed. The mother and two children were dead. The Jury returned a verdict to the effect that the mother committed suicide during temporary insanity, and that the children were asphyxiated through her action.

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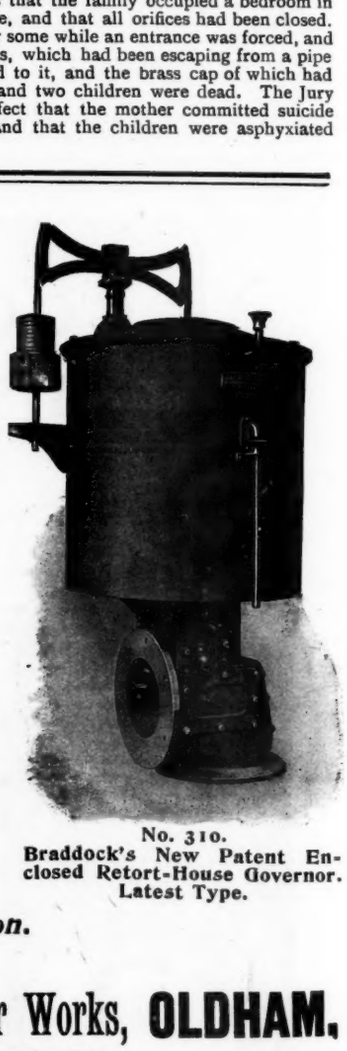

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Carlisle and its Gas Supply.—The monthly meeting of the Carlisle City Council was held last Tuesday, when the Gas Committee recommended an increase of 5d. per 1000 cubic feet on the present price of 2s. 4d. Mr. Buck, the Chairman of the Committee, explained that there was a loss on last year's accounts of £1025; but, considering the increased charges the department had had to meet, there was a very satisfactory balance-sheet. This year they were faced with further considerable increases in the price of important materials—including £4000 more for coal, £2700 for oil, and £1250 for wages and other items. The total estimated deficit at the end of the year would be £7025. The extra 5d. in the price would bring in £7416. On the motion of Mr. J. W. Nicholson, who contended that the proposed increase was unjustified, the matter was adjourned until the next meeting.

John E. Williams and Co has been registered as a joint-stock company, to carry on the business of colour merchants. The capital is £10,000 in £1 shares.

A mechanic's labourer, named Wright Bramhall (aged 43), of West Bowling, Bradford, died last week as the result of gas poisoning. He was found in bed with a flexible gas-tube in his mouth and the gas turned on.

It is reported that the largest compensation claim for damage caused by the rebellion in Ireland is that of the Alliance and Dublin Consumers' Gas Company—£157,000.

The Secretary of the Diss Gas Company applied for the exemption of a stoker, only two of whom, it was said, were left at the works. Conditional exemption was granted.

The Halifax Town Council, by a large majority, have decided not to accept a proposal that the Town Clerk, Borough Treasurer, and Gas Manager be permitted to have premium articled pupils.

The Gloucester Gas Company applied to the local Tribunal for the retention of a carbonizing clerk and time-keeper, whom they regarded as indispensable and in a reserved occupation. It was stated that this was the only man the Company were claiming for. Exemption was granted until Sept. 30.

A War Savings Association has been formed in connection with the firm of Messrs. Willey and Co., of Exeter. The employees of each department have elected one of their members to serve on a General Committee; and an application for affiliation has been sent to the London Committee. In the meantime, a large proportion of the employees have expressed a desire to subscribe to the scheme, and it is hoped eventually it will include the whole of the workpeople.

STOCK MARKET REPORT.

THE long-deferred, though inevitable, has at last happened; and the free rise in Stock Exchange prices has received a material check. The Bank of England rate of discount—after standing at 5 per cent. for two years, less four weeks—was last Thursday raised to 6 per cent. Some have it that this was foreseen; but it did not seem so on Monday when markets opened full of go, and almost everything that moved at all went up. Next day, however, the tightening of money was plainly evident; and on the Wednesday another turn of the screw was felt, and prices in all lines drew in their horns. All doubts, if any existed, were set at rest on Thursday afternoon by the Bank Directors; and Stock Exchange prices were adjusted to the new money value, but with calm moderation. Only here and there, owing to special circumstances, could a few advances be noted. On Friday and Saturday, the monetary influence was temperately in action; but, on the other hand, a spirit of cheerfulness was infused by the receipt of Sir Douglas Haig's despatches from the Western seat of war. As might be expected, in the conditions of the week, the best things have been the principal sufferers; and Home Government issues and the gilt-edged group generally were very dull. But the advanced rate was good for Treasury Bills, of which there were big sales. The other markets as a rule were dull too, except that in Americans, South Africans, and the Miscellaneous a few bright points were perceptible. Business in the Gas Market was moderate—mostly in Gas Light and Imperial Continental. The former gained nearly 3 points, and the latter 7, despite a little check when the Bank rise came. The general tone was quite firm. Among topics of interest, the early resumption of quotations of buying and selling prices, and the abolition of "bargain" quotations, is being discussed; but whether this desirable restoration can safely be accomplished yet awhile is not a certainty. In some markets it could scarcely be managed at all.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 82, 82¼, 82⅜, 82½, 83, Imperial Continental 102, 104½, 105, 105½, 106, 106½, Primitiva 41s. 3d., ditto preference 62s. 6d. On Tuesday, Gas Light ordinary 82, 82½, 83, Imperial Continental 105½, 106, 107, 108, Metropolitan of Melbourne 98, Oriental 107, Primitiva 40s., 40s. 6d., 41s., ditto preference 65s., 66s. 10½d., 67s. 6d., South Metropolitan 83, 83¼, 83½, Wandsworth "B" 103, 103½. On Wednesday, Gas Light ordinary 82½, 82⅝, 83, 83¼, ditto maximum 61½, 62, ditto 10 per cent. Bonds 192, Imperial Continental 106½, 107½, 108, Primitiva 42s., ditto preference 67s. 6d., South Metropolitan 83½, 83¾, Tottenham "B" 91, 91½. On Thursday, Bournemouth debenture 54, 54¼, Cape Town 28s., Gas Light ordinary 82½, 82¼, 83, Imperial Continental 105½,106, 106½, 107, 107½, South Metropolitan 84. On Friday, Commercial 3½ per cent. 70, Gas Light ordinary 80, 80½, 81, 82, 82¼, 82⅜, Imperial Continental 105, 106, Primitiva 40s., 41s. 3d., South Metropolitan 83⅜, ditto debenture 60, 60¼. On Saturday, Bombay 5 5/16, 5⅜, British 35¼, Gas Light ordinary 80, 80¼, 80⅜, ditto maximum 62, Imperial Continental 100, 104, 105½, South Metropolitan 83½, 83¾, 84.

The Bank rate is 6 per cent.—as fixed on July 13 last.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div or Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.				£ s. d.	
1,551,868	Stk.	April 8	2½	5⅛	Alliance & Dublin Ord.	59—64	8 18 2	..
874,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76—79	5 1 3	..
280,000	5	April 29	7½	3/-	Bombay, Ltd.	5⅞—6⅜	5 17 8	5 11/16—5⅞
50,000	10	Feb. 26	18	15/-	Bournemouth Gas and Water { 10 p.c.	29—30	6 6 8	..
338,110	10	,,	7	7/-	Bournemouth Gas and Water { B 7 p.c.	15—15½	4 10 4	..
115,000	10	,,	6	6/-	Bournemouth Gas and Water { Pref. 6 p.c.	13½—14	4 5 9	..
153,740	—	—	—	4	Bournemouth Gas and Water { 4 p.c. Deb.	..	—	54—5 1/2
992,045	Stk.	Feb. 26	†14	56/-	Brentford A Consold.	261—266	5 5 3	..
734,920	,,	,,	†11	55/-	Do. B New	204—209	5 5 3	..
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	4 10 1	..
221,400	,,	June 11	4	4	Do. 4 p.c. Deb.	91—93	4 6 0	..
217,380	Stk.	Feb. 26	11	10⅜	Brighton & Hove Orig.	208—213	5 8 4	..
244,200	,,	,,	8	7⅞	Do. A Ord. Stk.	154—159	5 0 8	..
680,000	20	Mar. 26	12½	22/6	British	44—45	5 11 1	35½
120,000	Stk.	June 26	4	4	Do. 4 p.c. Deb. Stk.	88—90	4 8 11	..
245,771	Stk.	June 26	4	4	Buenos Ayres 4 p.c. Deb.	85—87	4 12 0	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	—	28/-
100,000	10	—	—	4/6	Do. 4½ p.c. Pref.	4—6	—	..
100,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	6 0 0	..
167,150	Stk.	Feb. 26	5	5	Chester 5 p.c. Ord.	108—110	4 10 11	..
1,618,380	Stk.	Feb. 12	5⅜/4	49/4	Commercial 4 p.c. Stk.	106—108	5 1 2	..
660,000	,,	,,	5¼	46/8	Do. 3½ p.c. do.	103—105	5 1 6	70
475,000	,,	June 11	8	8	Do. 3 p.c. Deb. Stk.	69½—71½	4 3 11	..
800 000	Stk.	,,	4	—	Continental Union, Ltd.	76—79	5 1 3	..
200 000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	5 18 8	..
278,400	,,	,,	—	11½	Croydon B and C 7 p.c.	..	—	..
492,270	Stk.	—	6	5⅜	Derby Con. Stk.	125—125	4 16 0	..
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	3 16 11	..
1,009,180	10	July 29	10	10/-	European, Ltd.	17½—18	5 11 1	..
16,827,185	Stk.	Feb. 10	4/17/4	42/-	Gas Light and Coke { 4 p.c. Ord.	98—102	4 15 6	80—83¼
2,600,000	,,	,,	3½	3½	Gas Light and Coke { 3½ p.c. max.	76—79	4 8 7	61½—62
4,062,335	,,	,,	4	4	Gas Light and Coke { 4 p.c. Con. Pref.	96—99	4 0 10	..
4,674,850	,,	June 11	8	8	Gas Light and Coke { 3 p.c. Con. Deb.	72½—74½	4 0 6	..
130,000	,,	,,	10	10	Gas Light and Coke { 10 p.c. Bonds	..	—	192
258,740	Stk.	Mar. 12	5	4½	Hastings & St. L. 3½ p.c.	87—89	5 12 4	..
70,000	10	April 29	11	6	Hongkong & China, Ltd.	16½—16¾	6 11 4	..
86,600	—	—	—	9½	Hornsey 7 p.c.	..	—	..
131,000	Stk.	Mar. 12	7½	7½	Ilford A and C	151—154	5 2 4	..
65,780	,,	,,	6⅜	5⅞	Do. B	115—118	5 8 0	..
66,500	,,	June 26	4	4	Do. 4 p.c. Deb.	92—94	4 5 1	..
4,940,000	Stk.	May 14	9	4½	Imperial Continental	150—160	5 12 6	100—108
1,235,000	Stk.	Feb. 12	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	4 1 5	..
235,242	Stk.	Mar. 12	6½	6½	Lea Bridge Ord. 5 p.c.	119—121	5 7 5	..
2,498,905	Stk.	Feb. 26	10	5	Liverpool 5 p.c. Ord. { A / B	211—213 / 146—148	4 18 11 / 4 14 7	..
306,083	,,	June 26	4	4	Do. 4 p.c. Pr. Deb. Stk.	..	—	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4¼—4⅝	6 9 9	..
250,000	100	April 1	4½	4½	Met. of Melbourne { 4½ p.c. Deb.	99—101	4 9 1	98
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	6 13 4	..
1,875,892	Stk.	July 29	4½	4½	Newc'tle&G'tesh'd Con.	98½—99½	4 10 6	..
529,705	Stk.	June 26	3½	3½	Do. 3½ p.c. Deb.	82—83	4 4 10	..
55,940	10	Feb. 26	7/14/0	7/8⅜	North Middlesex 7 p.c.	14—15	5 2 8	..
300,000	Stk.	May 14	8	8	Oriental, Ltd.	117—122	6 11 2	107
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅞	6 9 0	..
60,000	50	Feb. 26	13	65/-	Portsea, Island B	128—131	4 19 3	..
100,000	50	,,	12	60/-	Do. C	118—121	4 19 2	..
52,000	50	,,	10	—	Do. D	..	—	..
249,980	5	April 29	8	—	Primitiva Ord.	5½—6	6 13 4	40/—42/-
499,960	5	June 26	5	2/6	,, 5 p.c. Pref.	4½—5	5 0 0	62/6—67/6
621,600	100	June 2	4	4	,, 4 p.c. Deb.	91—93	4 6 0	..
—	—	—	—	4	,, ,, ,, 1911	..	—	..
346,198	Stk.	June 26	4	4	River Plate 4 p.c. Deb.	85—87	4 12 0	..
150,000	10	May 14	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	5 9 1	..
125,000	50	July 1	5	5	San Paulo { 5 p.c. Deb.	47—49	5 2 0	..
135,000	Stk.	Mar. 12	10	10	Sheffield A	223—224	4 9 8	..
209,984	,,	,,	10	10	Do. B	222—224	4 9 8	..
523,500	,,	,,	10	10	Do. C	220—222	4 10 1	..
90,000	10	May 28	9	6/-	South African	10½—11½	7 16 6	..
6,609,895	Stk.	Feb. 10	5/4/0	44/-	South Met., 4 p.c. Ord.	111—113	4 16 8	83—84
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb.	72½—74½	4 0 6	60—60½
224,820	Stk.	Feb. 26	8½	8	South Shields Con. Stk.	157—159	5 6 11	..
962,795	Stk.	Feb. 26	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	5 8 5	..
60.000	,,	,,	5	5	Do. 5 p.c. Pref.	110—113	4 9 8	..
135,000	—	—	—	48/4	Do. West Kent.	..	—	..
187,558	,,	June 26	5	5	Do. 5 p.c. Deb. Stk.	116—118	4 4 9	..
647,740	Stk.	May 14	5	5	Southampton Ord.	99—102	4 18 0	..
120,000	Stk.	Feb. 12	7½	7½	Tottenham District { A 5 p.c.	135—138	5 8 8	..
782,275	,,	,,	6	6	Tottenham District { B 3½ p.c.	115—117	5 2 7	91—91½
181,255	,,	June 26	4	4	Tottenham District { 4 p.c. Deb.	87—89	4 9 11	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	8 6 8	..
149,900	10	July 1	5	5	Do. 5 p.c. Deb. Red.	93—95	5 5 3	..
286,476	Stk.	Mar. 12	5	5	Tynemouth, 5 p.c. max.	108½—109½	4 11 4	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	Stk.	Feb. 26	8⅜	78/9	Wandsworth A 5 p.c.	151—155	5 7 4	..
255,686	,,	,,	6⅜	63/9	,, B 3½ p.c.	129—134	5 2 7	108—108½
108,075	,,	,,	5/13/8	55/1½	,, C 3½ p.c.	110—115	5 2 0	..
352,000	,,	,,	6½	57/6	Wimbledon 5 p.c.	117—122	5 0 5	..
98,000	,,	,,	6⅜	63/9	Epsom 5 p.c.	121—126	5 5 2	..
88,416	,,	June 26	3	3	3 p.c. Deb. Stk.	66—69	4 6 11	..

† Paid on Old 10 p.c. and 7 p.c. Standard Stocks.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER AND MANAGER. Morecambe Gas Department. Applications by July 29.
GENERAL MANAGER INCANDESCENT MANTLE FACTORY. No. 6195.
WORKING MANAGER. No. 6198.
FOREMAN (METER FACTORY). No. 6194.
DRAUGHTSMAN. No. 6196.

Appointment Wanted.

HEAD CLERK, CASHIER, ACCOUNTANT, &c. No. 6199.

Plant, &c. (Second Hand), for Sale.

MOND GAS PLANT. Fenton and Sons, Batley.

Meetings.

GAS LIGHT AND COKE COMPANY. Horseferry Road. Aug. 4. Twelve o'clock.
SOUTH METROPOLITAN GAS COMPANY. Cannon Street Hotel. Aug. 9. Two o'clock.
SOUTH SUBURBAN GAS COMPANY. Gas-Works, Lower Sydenham. Aug. 11. Three o'clock.

TENDERS FOR

Fire-Clay Goods.

SALFORD GAS DEPARTMENT.

Lighting Goods (Lamps, Burners, Mantles, Glass, &c.).

CALCUTTA CORPORATION. Tenders by Sept. 11.

Pipes, &c.

TIPTON GAS-DEPARTMENT. Tenders by July 24.

Tar and Liquor.

BUXTON GAS DEPARTMENT. Tenders by July 24.
STRATFORD-ON-AVON GAS-WORKS.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders to Alter or stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Saturday.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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THANKS are expressed to the Candidates who sent in Applications for the above, and are hereby notified that the POSITION HAS NOW BEEN FILLED.
GEORGE HERRIS,
Secretary, *pro tem.*
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(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive Applications for the Post of ENGINEER and MANAGER of their Gas Undertaking, at a Salary of £200 per Annum.
Applications, giving full Particulars as to Age, Qualifications, and Experience, accompanied by Three *copies* of recent Testimonials, and stating how soon duties can be taken up, must reach the undersigned not later than the 29th of July inst.
Canvassing, directly or indirectly, will disqualify.
T. PONSONBY TILLY,
Town Clerk.
Town Hall, Morecambe.